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# COMMUNITY WATER SUPPLY STUDY, NEW YORK STANDARD METROPOLITAN STATISTICAL AREA

Bureau of Water Hygiene
New York, New York

June 1970

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# COMMUNITY WATER SUPPLY STUDY

# NEW YORK

# STANDARD METROPOLITAN STATISTICAL AREA

Bureau of Water Hygiene

Environmental Health Service

Public Health Service

Department of Health, Education, and Welfare

Region II - New York, N. Y.

June 1970

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Everett L MacLeman

Everett L. MacLeman, P. E.
Regional Representative
Bureau of Water Hygiene
Public Health Service
Department of Health,
Education, and Welfare

## TABLE OF CONTENTS

PAGE

I SUMMARY OF FINDINGS AND CONCLUSIONS 1
II RECOMMENDATIONS 13
III INTRODUCTION 17
IV SCOPE 20
  A. Study Area (Figure 1, Tables 1, 2) 22
V METHODS
  A. Field Survey 27
  B. Sampling Program (Table 3) 29
  C. Laboratory Procedures 33
VI DATA SUMMARIES
  A. Chlorinated Water Systems (Table 4) 37
  B. State Licensing of Operator Training Program (Tables 5, 6) 39
  C. Approved Laboratories (Bacteriological Sampling, Table 7) 45
  D. Chemical Analysis 51
  E. Radiological Analysis 53
  F. Sanitary Surveys 55
  G. Cross-Connection Program 56
  H. Fluoridation (Table 8) 62
  I. Pesticides 64
  J. Carbon Adsorption Technique 65
  K. Water Quality Evaluation 68
VII DISCUSSIONS
  A. Water Resources Development 70
    1. Drinking Water Quantity 70
    2. Drinking Water Quality 73
  B. Waterborne Diseases, et cetera (Figure 2) 78
  C. Nitrate Pollution of Ground Water (Figure 3) 92
  D. Salt Water Intrusion 95
  E. Pesticides, Insecticides, and Herbicides 97
  F. Research 106
  G. Technical Services and Publications by Public Health Service 110
  H. Public Education 112
  I. Consolidation of Public Water Systems 114
  J. Public Health Service Interstate Carrier Water Supply Program 117

APPENDICES

TABLE OF CONTENTS A1

## TABLES

1. Water Systems: Demographic and Other Data
2. Estimated 1968 and 2020 Population and Water Consumption
3. Summary: Sampling and Testing
4. Chlorination of Water Systems
5. Water Treatment Operator Licensing
6. Section 11.63 of State Sanitary Code -- Licensing
7. Bacteriological Sampling
8. Fluoridation

## FIGURES

1. New York Standard Metropolitan Statistical Area
2. New York City Tunnels
3. Geologic Section - Nassau County

# I. SUMMARY OF FINDINGS AND CONCLUSIONS

The Public Health Service Community Water Supply Study for the New York Standard Metropolitan Statistical Area was conducted between April 24 and September 15, 1969. Objectives of the study were to determine: the following:

whether the quality of the consumers' drinking water met New York State and Public Health Service Drinking Water Standards,

if the water supply systems were essentially free of major deficiencies,

if the surveillance programs were insuring a safe drinking water, and

the needs, present and future, of the water supply systems.

The Study covered 209 water supply systems, providing 1,776 MGD to a population of 11,421,416 in an area of 2,163 square miles. Approximately 18,000 tests were run on over 2,580 samples collected in about 150 mandays of actual contact with the utilities. To provide more depth to the study the participating health departments not only investigated and resampled where discrepancies appeared, but also provided additional information which would not normally be brought to light in such a short period.

The study revealed that at the time of the Community Water Supply Study fifteen of the 209 public water supply systems had one or more constituents exceeding mandatory standards. Health departments were notified and corrective action was taken. However, it requires constant effort by the purveyors, through surveillance and increased treatment, to maintain water quality. Increasing water demands of the area, estimated at 3,500 MGD by the year 2020, coupled with all the pollutants being discharged into the environment, are gradually causing a decrease in the water quality of existing sources. Additional sources for the future will in some cases no longer be available from the controlled upland areas, but will have to be waters of poorer quality.

The New York SMSA is an outstanding area relative to long term research and engineering planning. It has many active conscientious water supply and health department personnel who can capably handle present problems and are fully aware of the needs of the future. It is an area that is cognizant of many of its problems. This study has attempted to identify all of these, along with some that might not have been realized, in order that proper consideration might be given to procedures for their elimination.

Where such elimination is beyond the capabilities of the local utility or health department, the assistance of the state or federal agencies should be made available.

If nothing else, the study does show the extensive need for effort by the U. S. Public Health Service or some other health oriented agency. When an area as large as this one, with the number of people, money and capable water supply personnel it contains, needs assistance, then what must other areas of the country without such capabilities need. An area such as the New York SMSA in many ways reveals the problems of the future for other areas. The solutions to such problems should be of tremendous aid to these other areas, as they approach the same or similar pattern of problems.

The New York SMSA is fortunate in having as many well qualified water supply personnel. This was evident from the number of college men and the excellent training and licensing programs.

During the Community Water Supply Study, it was evident that those responsible for drinking water supply programs in the New York SMSA were trying to do the job they felt necessary to protect the health of the public, but also that their job was made more difficult by heavy pressure to expend a greater amount of time and effort on water pollution control. Although water pollution control has many health implications, it does not have the direct everyday potential health hazard of unsafe drinking water. Funds, positions and time are heavily weighted in favor of water pollution control, contrasted with drinking water control activities.

## Interstate Carrier Water Supply-New York State Water Supply Programs

In the New York SMSA at the time of the Community Water Supply Study there were seven interstate carrier water supplies of which one was rated as provisional and six as approved.

The Interstate Carrier Water Supply program is the only one in which the federal government can directly assist state and local health departments in efforts to insure a safe drinking water supply.

Just prior to the initiation of the field work for the Community Water Supply Study, the state health department released Form 255, "Summary of Annual Inspection of Public Water Supply." Public Health Service Form 682, "Report of Water Supply Used on Interstate Carriers," served as a basis for the new state form. As the Public Health Service form checks compliance of interstate carrier water supplies with the 1962 Drinking Water Standards, so the state form will check compliance of all state water systems with New York State Drinking Water Standards. This form will cover the 1,700 public water systems of the state. In addition, New York State, in so far as possible, will be undertaking special studies similar to that required for each interstate carrier water supply but on systems other than those serving interstate carriers. This state program will provide continuous surveillance relative to the drinking water standards. (Pages 117-119)

## Technical Service

The Community Water Supply Study made many staff members of health departments and utilities aware that there are numerous problem areas in which the Public Health Service as well as the State Department of Health can provide assistance. This assistance can vary from providing publications to services either through qualified personnel or facilities on special problems. (Pages 110-111)

## Public Education

Over the past decade or so waterborne diseases have been reduced to such a degree the general public takes the safety of our water supply systems for granted. Little do people realize or appreciate the effort being expended by those responsible for this safety. However, even in an area as outstanding as the New York SMSA, the problems facing water supply personnel will need public support, if our water supply systems are to remain safe. (Pages 112-113)

## Pesticides, Insecticides, and Herbicides

One of the more critical problems facing water supply systems in the New York SMSA, with both surface and ground sources, is the widespread use of pesticides, insecticides, and herbicides. The use of these chemicals on lawns, for termite control, on right of way, for agriculture, and their use on both the watershed and in the reservoirs has caused a great deal of concern among all those responsible for protecting the public's drinking water. (Pages 64, 101-105)

## Waterborne Diseases And Other Associated Waterborne Health Problems

Present water supply practice and constant surveillance have reduced the incidence of communicable disease to such a degree that very few outbreaks can be traced to water supplies. However, as the majority of cases presented in this report indicate, there are other health implications which are just as important and require constant surveillance. (Pages 78-91)

## Cross-Connections

The Community Water Supply Study revealed that there is not only a need to determine what an adequate cross-connection program is, but also what a program should include and how it should be run. For what probably is one of the most important health aspects of water supply systems, the lack of knowledge relative to both codes and continuing programs was very evident. Of the 209 systems surveyed 102 indicated that they were not aware of any code, and 177 indicated they did not have a cross-connection program. The special surveys covering the larger cities showed the New York SMSA to be among the leaders with regard to such programs, but even with these systems there is a need for extensive improvement. (Pages 56-61)

## Chemical Analysis

A high percentage of systems had chemical analysis performed at least once during the previous twelve-month period; but, many knew only of poor results. The larger systems had a very good record and frequency of sampling; however, this was not true for the majority of the smaller systems. These systems (33 serving a total of less than 10,000) were not complying with the following two excerpts from Section 5.30, Item 5 of Part 5 of the State Sanitary Code.

> "The minimum number of samples to be collected from the distribution system and examined for chemical analyses shall be two per year at six month intervals
>
> "The untreated waters of the source shall be sampled at the following minimum frequency; ground water, annually; surface waters, semiannually."

(Pages 51-52)

## Sanitary Surveys

The Community Water Supply Study revealed that no sanitary surveys were being conducted for 75 of the 209 public water supply systems contacted. (Page 55)

## Chlorination

The New York State Sanitary Code requires disinfection of surface systems only. However, in the New York SMSA about 50% of the ground water systems have chlorination. One supply was not complying with the state sanitary code and six were not meeting county requirements. (Pages 37-38)

## Fluoridation

In the New York SMSA, where one supply serves over 7.6 million people and requires only three fluoridation facilities, the program is quite successful; however, when there are many sources requiring a great number of units, the operating costs and problems, coupled with any degree of public objection, generally results in no program. Only 18 of the 209 systems surveyed during the CWSS were applying fluoride.

The current shortage of chemicals has also been detrimental to most fluoridation programs. (Pages 62-63)

## Radiological Analysis

New York City and Westchester and Nassau counties had good records relative to radiological analysis. This was not true in the remaining two counties. There has been a steady increase in the use of radionuclides throughout the area by industry, including nuclear generating plants which requires at least a minimum surveillance throughout the entire SMSA. (Pages 53-54)

## Consolidation of Public Water Supply Systems

In the New York SMSA, there have been two trends towards consolidation. For Nassau and Westchester Counties the general trend is towards numerous systems serving 10,000 to 100,000, while for New York City and Rockland and Suffolk counties, it appears to be one large company serving the entire area. (Pages 114-116)

## Difference Between New York State and Public Health Service Drinking Water Standards

Currently there are discrepancies between the Public Health Service drinking water standards and state standards. New York State has a manganese limit of 0.3 ppm, while the Public Health Service standard is 0.05 ppm. In addition, there is a difference in the curve for the minimum number of monthly bacteriological samples. (Pages 106-107)

## Carbon Adsorption Technique

The carbon chloroform extract results from the carbon filters installed on the systems in the New York SMSA have raised some doubts about the procedure. Although the procedure measures many substances, it provides gross information only. To know whether substances are present or not is important; but even more important is to be able to measure each substance both qualitatively and quantitatively -- without this information, tolerance limits can not be set nor degree of removal determined.

Extensive research and development are needed on the carbon filter procedure or new procedures so that all the new chemicals can be measured individually both on qualitative and quantitative basis. With the constant development of new chemicals by industry, this is a never ending task, one that will require extensive funds for qualified staff and equipment and/or sponsored research. (Pages 65-67, 73-77)

## Nitrate Pollution of Ground Water

One of the most critical problems facing water supply systems in the New York SMSA is the nitrate pollution of ground water in certain areas of Long Island. In one county, 20 public water supply wells have nitrates exceeding the Drinking Water Standards. In order to meet the standard purveyors have resorted to blending with other wells, drilling deeper or abandoment. (Pages 92-93)

## New York City's Upland Surface Supplies and Future Sources

The Community Water Supply Study data indicated that the water from New York City's three major surface systems meets the drinking water standards. However, a review of past records reveals a slow, but steady deterioration in the water quality of all three systems. They are being subject to the effects of agriculture, suburban growth, and industrial growth throughout their water sheds. (Pages 73-77, A54-56)

## Training and Licensing Programs

New York State has for some time had outstanding training and licensing programs. County training programs have greatly assisted the operator licensing program. The CWSS revealed 27 systems were not complying fully with the requirements of the State Sanitary Code. (Pages 39-44)

## Approved Laboratories

In the New York SMSA the Community Water Supply Study there were approximately a dozen state health department approved laboratories, including the county and municipal facilities. Owing to geographical and other factors, compliance with the State Code on minimum number of samples (34,063 annually for the 209 systems) has been difficult to achieve. During the study 152 water supply systems were not meeting this State code requirement. The 209 systems were collecting 29,041 samples of the 34,063 required.

One proposed solution is the addition of state run laboratories. Four or five such new laboratories will not solve all of the difficulties, especially the time factor with regard to the transportation of the samples. However, it was evident that a solution is needed as soon as possible in order that the public will receive the protection as set forth in the State Sanitary Code. (Pages 45-50)

It is seriously hoped that this study will prove beneficial to all concerned. Two counties are already making use of the information collected for this report as an initial step in an expanding water program that seeks complete compliance with the New York State Sanitary Code.

To many our human resources are just as important as our natural resources. It is hoped that this report will assist in the protection of human resources in one of its most important supporting elements - Drinking Water.

# S U M M A R Y

| | | WATER QUALITY * | | SURVEILLANCE | | DEFICIENCIES | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of systems in which average water quality exceeded one or more | | Number of systems not meeting bacteriological sampling frequency | | Number of systems with deficiencies in the listed category | | | | | | | |
| | | | | | | | | | | | | Cross-Connection | |
| | Total Number of Systems | Mandatory Limits | Recommended Limits - Not Mandatory | PHS Standard | NYS Standard | Chlorination | Operator Licensing | Approved Laboratory | Chemical Analysis | Radiological Analysis | Sanitary Survey | Code | Program |
| Rockland | 36 | 2 | 6 | 36 | 36 | 1 | 3 | 1 | 10 | 32 | 28 | 27 | 35 |
| Westchester | 54 | 10 | 10 | 49 | 36 | 0 | 8 | 0 | 4 | 23 | 12 | 25 | 38 |
| Nassau | 45 | 1 | 8 | 35 | 12 | 0 | 1 | 0 | 2 | 42 | 0 | 6 | 35 |
| Suffolk | 71 | 2 | 26 | 70 | 68 | 6 | 15 | 0 | 7 | 71 | 34 | 54 | 69 |
| SUB TOTAL | 206 | 15 | 50 | 190 | 152 | 7 | 27 | 1 | 23 | 168 | 74 | 112 | 177 |
| New York City | 3 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| TOTAL | 209 | 15** | 53 | 191 | 152 | 7 | 27 | 1 | 23 | 169 | 75 | 112 | 177 |

* See also Chapter VI Section K, Water Quality Evaluation, Pages 67, 68

** These fifteen systems serve approximately 50,000

## II. RECOMMENDATIONS

1. Consideration should be directed to requiring chlorination of all distribution systems, regardless of water sources, on a continuous basis. *

2. Health-oriented agencies should be responsible for the regulation of the water quality aspects of public drinking water programs so that the protection of our human resources does not become submerged by a concern for our natural resources.

3. Funds must be made available, if not from local or state sources, then from the federal government in the form of program grants. These funds should be used not for new or greatly expanded programs, but for staff and facilities required to insure the protection of the public health, and to assure that all phases of drinking water supply systems meet the established codes, standards and laws. A portion of these funds should be made available for training and licensing programs.

4. The purveyor must assume responsibility for basic water quality control. Health departments must maintain surveillance over the purveyor and provide the laboratory facilities for testing constituents for which the purveyor does not have the capabilities.

5. Funds and positions are needed by both the New York State health agencies and the Public Health Service to support the latter's interstate carrier water supply program and the recently initiated similar state program.

---

* On June 17, 1970 the State Commissioner of Health requested that Section 5.20 of the State Sanitary Code be amended to require that all municipal ground water supplies, as well as surface, receive a minimum treatment of chlorination. This is being submitted to the Public Health Council at their next meeting on August 7, 1970.

6. Immediate and continuing effort on the following items should be undertaken relative to pesticides, insecticides, products of the fast growing synthetic organic chemical industry and even some of the more common chemicals and trace metals:

a. Determination of their toxicity or carcinogenic affect on humans when consumed through drinking water.

b. Determination of tolerance levels relative to human health and the setting of standards based on allowances for all sources of human exposure.

c. Development of testing procedures for determining their presence and amount.

d. Development of effective economical treatment removal methods.

e. Development of surveillance procedures that will provide constant protection for water supplies.

f. Development of laws, ordinances, et cetera, that will provide effective control over their use in water supply systems and on watersheds.

Extensive funds are needed for the foregoing for in-house Public Health Service research and/or sponsored research.

7. All of the water supply systems covered in the New York SMSA should expend more effort on their cross-connections programs. Although the basic responsibility for such programs in New York rests with the purveyor, health departments must take responsibility for coordinating all program phases covered by themselves, the purveyor, the building department or other appropriate agency to insure the existence of an adequate continuing program.

8. Relative to both cross-connection and sanitary survey programs, criteria as to what constitutes an adequate program should be developed for both ground and surface supplies based on facilities, type of treatment, distribution system, size of supply, population and industry served. Guides should be included for a priority system which takes into account all phases of operating a water supply system.

9. Technical services to local health agencies and water supplies should be increased by making available expertise, facilities and publications that are beyond local capabilities. This service should be provided by both the State Health Department and the Public Health Service.

10. Research should be carried on to provide shorter testing procedures in order that potential health hazards do not become real during the testing period. This is especially true for bacteriological examination, where a test that produced results within several hours would be highly desirable.

11. Present Public Health Service research efforts relative to limits and methods of removing nitrates should be increased.

12. Research should be undertaken relative to the entrance of pesticides into ground water, their persistance, rate and distance of travel.

13. A greater effort should be made to provide fluoridated water to all consumers served by public water supply systems. Presently about 30% of the population served by these systems in the New York SMSA is not receiving fluoridated water.

14. New York City should continue its studies for developing treatment facilities for its three major surface supplies and its potential source, the Hudson River, as presented in preliminary planning reports. Such action is necessary in view of the time lag between planning, construction, and operation of the facilities of the magnitude required. *

15. Consideration should be given to the eventual elimination of smaller systems, in order that the public might benefit from the better protection generally provided by larger systems.

16. A public education program should be developed to generate support for the effort required to keep all water supplies safe both now and in the future. A knowledgable public will support a program that provides a safe drinking water.

---

* Governor has appointed a commission to study the water resources needs of the New York Metropolitan area

## III INTRODUCTION

The purpose of the Community Water Supply Study (CWSS) was to determine if the American consumer's drinking water met the Drinking Water Standards.* To obtain nationwide coverage, the Bureau of Water Hygiene of the U. S. Public Health Service initiated the CWSS in February of 1969 in nine areas across the country. The field work for the CWSS was conducted by the Bureau of Water Hygiene, in cooperation with the state and local health departments and the water utilities.

This study was designed to give an assessment of drinking water quality, water supply systems, and surveillance programs in urban and suburban areas in each of the nine regions of the Department of Health, Education, and Welfare. These areas were selected to give examples of the several types of water supplies in the country. A whole Standard Metropolitan Statistical Area (SMSA) was the basis of each study, except in Region I where the entire State of Vermont was included, with evaluations made on all public water supply systems, as defined herein, in each study area. This coverage allowed an assessment of the drinking water quality of the large central city, the suburbs, and the smaller communites located in the counties in the SMSA, and the interaction between them.

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* 1962 U. S. Public Health Service Drinking Water Standards; PHS Publ. No. 956, Superintendent of Documents, Government Printing Office, Washington, D. C. 20402, 61 pp.

Specifically, the objectives of this study were accomplished by determining whether or not:

1. The quality of the urban and suburban American consumer's drinking water in the selected study areas exceeded the Constituent Limits of the Drinking Water Standards (DWS);*
2. The water supply systems supplying this drinking water to the consumers were essentially free from major deficiencies;
3. The bacteriological surveillance programs over these water supply systems meet the established criteria.

The authority for the Community Water Supply Study is found in Title III, Part A, Section 301, Public Health Service Act, amended (42 U. S. C. 241).

> "Sec. 301 - The Surgeon General shall conduct in the Service, and encourage, cooperate with, and render assistance to other appropriate public authorities, scientific institutions, and scientists in the conduct of, and promote the coordination of, research, investigations, experiments, demonstrations, and studies relating to the causes, diagnosis, treatment, control, and prevention of physical and mental diseases and impairments of man, including water purification..."

---

* 1962 U. S. Public Health Service Drinking Water Standards; PHS Publ. No. 956, Superintendent of Documents, Government Printing Office, Washington, D. C. 20402, 61 pp.

## Definition of Standard Metropolitan Statistical Area (SMSA)

STANDARD METROPOLITAN STATISTICAL AREA (SMSA) -- The boundaries and titles of standard metropolitan statistical areas are established by the Bureau of the Budget with the advice of the Federal Committee on Standard Metropolitan Statistical Areas. An SMSA is a county or group of contiguous counties, which contains at least one city of 50,000 inhabitants or more or "twin cities" with a combined population of at least 50,000. In addition to the county, or counties, containing such a city or cities, contiguous counties are included in an SMSA if, according to certain criteria, they are essentially metropolitan in character and are socially and economically integrated with the central city.

## IV. SCOPE

Public water supplies in the United States numbered 19,236 serving some 150,000,000 people when last inventoried in 1963.* The remaining 50,000,000 people had private water supplies. Most of the public water supplies were small, about 85 percent serving 5,000 or less people. About one-half of the public was served by the 18,837 supplies that each served 100,000 or less persons and the other one-half (77,000,000) were served by the 399 larger supplies. About 75 percent of these public water supplies have ground water as a source, while 18 percent use surface water. The remaining 7 percent have a mixture of ground and surface water source.

The nationwide Community Water Supply Study (CWSS) included eight geographically distributed SMSA's and the State of Vermont. It covered 969 public water supply systems, including 885 community water supply systems (91.4% of the total) and 84 special water supply systems (9.6% of the total). For this study the following definitions of the systems were used.

> PUBLIC WATER SUPPLY SYSTEM - A water supply system includes the works and auxiliaries for collection, treatment, storage, and distribution of water from the sources of supply to the free-flowing outlet of the ultimate consumer. Water supply systems were included in this study, if they had 15 or more service connections and/or served 25 or more consumers.

---

* Statistical Summary of Municipal Water Facilities in the United States, January 1, 1963: PHS Publ. No. 1039, Government Printing Office, Washington, D. C. 20402, 1965, 66 pp.

Special Water Supply Systems - are those systems serving trailer and mobile home parks, other tourist accommodations, and institutions with resident populations.

## IV. A. STUDY AREA

The Community Water Supply Study for the New York SMSA covered the four counties around New York City and the city itself. The four counties were Rockland, Westchester, Nassau, and Suffolk. Actually, New York City is composed of five counties although they are shown as boroughs-Manhattan, Bronx, Queens, Kings (Brooklyn), and Richmond (Staten Island). Figure 1 is a map of the New York SMSA.

A total of 209 public water supply systems (22.8% of the national study total) serving over 11,400,000 persons (68% of the national study total) were studied. Table 1 presents a breakdown of these figures and other data.

Based on figures obtained during the study, it is estimated that over 1.776 billion gallons of water are used each day in the New York SMSA. Although the estimated daily consumption presented in Table II is about 34 MGD lower than the CWSS estimate, the table does provide an idea as to the present and future breakdown between industrial and non-industrial water consumption.

About 1.34 billion gallons is provided daily by the major New York City (surface) system. Both Rockland and Westchester Counties also have surface systems along with wells. Some areas of Westchester are also served by the New York City system. The entire Long Island area (Nassau and Suffolk) and the two smaller New York City systems derive their water from wells.

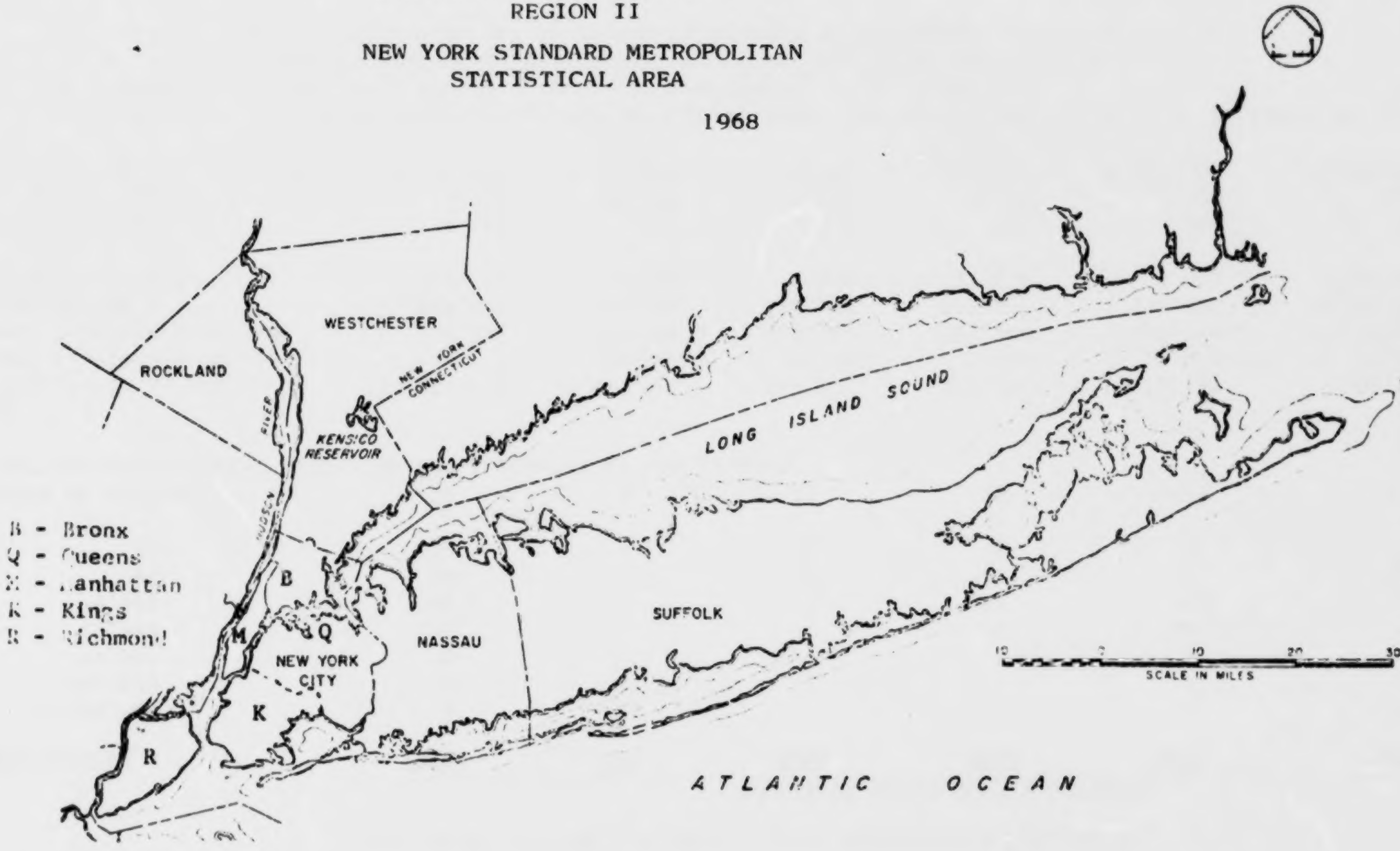
FIGURE I

U. S. PUBLIC HEALTH SERVICE

COMMUNITY WATER SUPPLY STUDY
REGION II

NEW YORK STANDARD METROPOLITAN
STATISTICAL AREA

1968


WESTCHESTER
ROCKLAND
HUDSON RIVER
KENSICO RESERVOIR
NEW YORK
CONNECTICUT
LONG ISLAND SOUND
B
Q
M
K
R
NEW YORK CITY
NASSAU
SUFFOLK
ATLANTIC OCEAN
10 0 10 20 30
SCALE IN MILES
B - Bronx
Q - Queens
M - Manhattan
K - Kings
R - Richmond

Reproduced from best available copy.

## TABLE 1

## PUBLIC WATER SYSTEMS - NUMBER, SIZES, POPULATIONS AND AREAS

| | NUMBER OF WATER SUPPLY SYSTEMS | | | | | |
|---|---|---|---|---|---|---|
| Population Range | Total | NYC | ROCK | WEST | NASS | SUFF |
| 500,000 - 10,000,000 | 3 | 2 | - | - | - | 1 |
| 100,000 - 499,999 | 6 | 1 | 1 | 1 | 2 | - |
| 50,000 - 99,000 | 9 | - | - | 3 | 5 | 1 |
| 10,000 - 49,999 | 39 | - | 1 | 9 | 24 | 5 |
| 1,000 - 9,999 | 66 | - | 5 | 22 | 8 | 31 |
| 100 - 999 | 70 | - | 19 | 17 | 4 | 30 |
| 25 - 99 | 16 | - | 10 | 1 | 2 | 3 |
| TOTAL NUMBER OF SYSTEMS | 209 | 3 | 36 | 54 | 45 | 71* |

* (12 Suffolk County Water Authority areas counted as one supply)

| Estimated | Total | NYC | ROCK | WEST | NASS | SUFF |
|---|---|---|---|---|---|---|
| Total Population Served | 11,421,416 | 7,965,000 | 211,571 | 922,850 | 1,419,789 | 902,206 |
| Transient Population Served | --- | ( 800,000)+ | 1,510++ | 1,650+++ | 16,000++++ | 23,865++ |
| Permanent Population Served | 11,378,391 | 7,965,000 x | 210,061 | 921,200 | 1,403,789xx | 878,041 |
| TOTAL POPULATION | 11,849,666 | 7,967,000 | 218,837 | 933,200 | 1,530,629 | 1,200,000 |
| POPULATION NOT SERVED | 347,435 | 2,000 | 8,876 | 12,000 | 3,000 | 321,659 |
| Area Square Miles | 2,163 | 314 | 178 | 449 | 300 | 922 |
| Population per square mile 1969 | 5,530 | 25,400 | 1,230 | 2,150 | 5,100 | 1,300 |
| Estimated Population for 2020 | 15,920,000 | 9,260,000 | 430,000 | 1,735,000 | 2,000,000 | 2,495,000 |

Transient: + Estimated daily from Connecticut, New Jersey and other New York areas- figure not included in totals
++ Summer residents, +++ bottle water plant and summer, ++++ school
x Does not include 30 systems in Westchester which use NYC water partially or entirely
xx Does not include 123,840 served in Nassau by Jamaica Water Company of New York City

TABLE 1 (continued)

| | TOTAL | NYC | ROCK | WEST | NASS | SUFF |
|---|---|---|---|---|---|---|
| Consumption MGD | 1,776.250 | 1,413.000 | 21.660 | 111.783 | 147.775 | 81.932 |
| Number of Systems reporting | 172 | 3 | 25 | 51 | 42 | 51 |
| Sources | | | | | | |
| Surface | 37 | 3 | 10 | 22 | -- | 2 |
| Wells (Number of) | 1,168 | 110** | 99 | 74 | 474 | 411 |
| NYC Aqueducts | 31 | -- | -- | 31* | -- | -- |
| Other Systems | 11 | -- | -- | 6* | -- | 5 |
| Ownership | | | | | | |
| Municipal or Community-publicly owned | 96 | 1 | 3 | 35 | 37 | 20 |
| " " privately owned | 71 | 2 | 7 | 14 | 5 | 43 |
| Institutions, camps, etc. | 42 | - | 26 | 5 | 3 | 8 |

* Directly or indirectly - wholly or in part use NYC Aqueduct Water - Thus a portion of 111.783 MGD is duplicated in 1,413.00 MGD not possible to separate - insufficient data.

** Does not include NYC-1 Standby wells

## TABLE 2

## ESTIMATED 1968 AND 2020 POPULATION AND WATER CONSUMPTION FOR NEW YORK CITY SMSA *

| | POPULATION | | CONSUMPTION, MGD | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1968 (1000s) | 2020 (1000s) | 1968 | | 2020 | | 1968 | 2020 |
| | | | Non-Indust | Industrial | Non-Indust | Industrial | Total | Total |
| New York City | (7,992) | (9,260) | (765) | (288) | (1200) | (512) | (1,053) | (1,712) |
| Bronx | 1,528 | 1,550 | 167 | 24 | 201 | 43 | 191 | 244 |
| Kings | 2,699 | 2,900 | 234 | 65 | 376 | 111 | 299 | 447 |
| Manhattan | 1,565 | 1,640 | 172 | 126 | 212 | 222 | 298 | 434 |
| Queens | 1,942 | 2,375 | 170 | 63 | 308 | 116 | 233 | 424 |
| Richmond | 258 | 795 | 22 | 10 | 103 | 20 | 32 | 123 |
| Rockland | 187 | 430 | 13.4 | 2.2 | 41 | 5.7 | 15.6 | 47 |
| Westchester | 853 | 1,735 | 89 | 7 | 261 | 15 | 96 | 276 |
| Nassau | 1,397 | 2,000 | 131 | 21 | 266 | 30 | 152 | 296 |
| Suffolk | 927 | 2,995 | 105 | 17 | 367 | 50 | 122 | 417 |
| TOTAL | 11,356 | 15,920 | 1,103.4 | 335.2 | 2,135 | 612.7 | 1,438.6 | 2,708 |
| INCREASE | 4,564,000 | | | | | | 1,270,400,000 | |

* Alternative Regional Water Supply Plans for Northern New Jersey - New York City - Western Connecticut Metropolitan Area, August 1969; Prepared by Metcalf & Eddy, Inc. and Hazen & Sawyer for the Department of the Army, North Atlantic Division Corps of Engineers

## V. A. METHODS, FIELD SURVEY

In order to insure that the Community Water Supply Study for the New York SMSA would be a cooperative State and Federal effort, correspondence was initiated by the Public Health Service on March 5, 1969. Additional correspondence (see Appendix A for copies of correspondence), meetings, and other contacts were completed by April 17.

On April 24, a field office was set up by the regional staff in the area provided by the New York State Regional Office in White Plains. On April 30, the first water system was contacted in Rockland County. All Rockland County and Westchester systems were handled through this office. On July 10, the White Plains office was closed and a new field office was established in the Riverhead Circle Motel, at Riverhead, in Suffolk County. All contacts for Suffolk and Nassau counties, as well as the two smaller New York City systems, were made from this field office. The major New York system was handled by a member of the New York Regional Office staff working out of the New York office. Field work was completed on September 15th.

In order to carry out the Survey, 16 different commissioned officers from the regional offices throughout the country, as well as Washington and Cincinnati, were assigned for one and two week periods. It is estimated that these men provided approximately 150 mandays. In addition, one officer spent 15 mandays contacting the nine large systems within the New York SMSA relative to cross-connection programs.

During this entire period, April 24 to September 15, 1969, the regional office staff participated continuously in the CWSS, while maintaining the work of the regional office.

A Form PHS-682, Report of Water Supply Used on Interstate Carriers, was prepared for each supply from state and local health department records.

During the field survey, the engineer completed Forms ECA-18, Inventory of Municipal Water Facilities, and ECA-19 Municipal Water Supply Sanitary Survey, to provide information on source; treatment; operation; laboratory control; personnel; distribution; surveillance practices; planning for improvements; and water rates. Examples of the standard forms are in Appendix F.

## V. B. SAMPLING PROGRAM

Table 3 shows the number of systems contacted, samples collected, and an approximation of the number of tests run by the Public Health Service laboratories.

The following samples were collected and dispatched to various Bureau of Water Hygiene laboratories:

1. Raw water

   One sample for bacteriological analysis was sent to the Northeast Water Hygiene Laboratory

2. Finished water ready for distribution

   Four or five samples for chemical analyses as follows:

   a. 2 1/2-gallon sample to the Northeast Water Hygiene Laboratory at Narragansett, Rhode Island. This was a grab sample for most ground water and small surface water treatment plants, but where possible a 14-day composite was taken. The following analyses were made on this sample:

      Arsenic
      Boron
      Chloride
      Color
      Cyanide
      MBAS
      Nitrate
      Selenium*
      Sulfate
      TDS
      Turbidity

---

* Not included in Table 3

## TABLE 3

## SUMMARY: SAMPLING AND TESTING

| | No. of Systems | Distribution System Bact | Distribution System Trace | Bact | Chem | Trace | Rad | CCE | Pest |
|---|---|---|---|---|---|---|---|---|---|
| | | **NUMBER OF SAMPLES** | | | | | | | |
| Rockland | 36 | 78 | 77 | 30 | 38 | 30 | 38 | 4 | 6 |
| Westchester | 54 | 154 | 158 | 35 | 40 | 38 | 40 | 11 | 14 |
| New York City | 3 | 118 | 115 | 3 | 15 | 14 | 15 | 12 | 9 |
| Nassau | 45 | 167 | 166 | 99 | 70 | 76 | 70 | 3 | 6 |
| Suffolk | 71 | 208 | 207 | 106 | 94 | 113 | 94 | 5 | 11 |
| Total Number of Samples | 2,587 | 725 | 723 | 273 | 257 | 271 | 257 | 35 | 46 |
| Times Number of Laboratory Tests* | | 4 | 12 | 4 | 10 | 12 | 3 | 1 | 10 |
| Total Number of Tests | 18,354 | 1,500 | 8,674 | 1,092 | 2,570 | 3,252 | 771 | 35 | 460 |

---

* Residual chlorine and pH not included

b. 8-oz aliquot sample for trace metals analysis was taken out of sample 2.a. above and sent to the Cincinnati Laboratory. The following analyses were made on this sample:

Barium*
Cadmium
Chromium
Cobalt
Copper
Fluoride
Iron
Lead
Manganese
Nickel
Silver
Specific Conductance
Zinc

c. 1-gallon sample for radioactivity analyses was sent to the Bureau of Radiological Health Laboratory in Winchester, Massachusetts. It was collected in the same manner as sample 2.a. above. The following analyses were made on this sample:

Specific gamma emitting radionuclides
$(^{131}I, {}^{137}C_s, {}^{140}Ba)$

Gross Alpha

Radium-226, if gross alpha exceeded 3 pc/l

Strontium-90, if gross beta exceeded 10 pc/l

Tritium - (run on 10% of samples)

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* Not included in Table 3

d. 1-gallon sample for pesticide analysis to the Gulf Coast Water Hygiene Laboratory from surface water supplies plus those ground water supplies where sampling was specifically requested by the state or county health officials. It was collected in the same manner as sample 2.a. above. The following analyses were made on this sample:

Aldin
Chlordane
DDT
Dieldrin
Endrin
Heptachlor
Heptachlor Epoxide
Lindane
Methoxychlor
Toxaphene

e. 1 activated carbon monitor sample to the Cincinnati Laboratory from 110 selected water supplies, 94 of which were from surface sources. Carbon chloroform extract (CCE) and carbon alcohol extract (CAE) concentrations were determined from this monitor.

3. Distribution System

Samples for bacteriological and trace metal analyses at the rate of 10 percent of the number required by Figure 1, of the DWS, with a minimum of 2 each from any water supply. The bacteriological samples were forwarded to the Northeast Water Hygiene Laboratory. The trace metals were mailed to the Cincinnati Laboratory.

## V. C. LABORATORY PROCEDURES

### Bacteriological

All samples were collected in 8-oz. sterile, plastic, wide-mouth, screw-capped bottles which contained 0.2 ml of a 10% solution of sodium thiosulfate as a dechlorinating agent. This concentration of thiosulfate was sufficient to neutralize a sample containing about 15 mg/l residual chlorine, an amount above any residual that was present. Refrigeration of all samples was provided during transportation to the Northeast Water Hygiene Laboratory. Maximum time between collection and analysis did not exceed 30 hours. The bacteriological procedures were those of Standard Methods.*

The membrane filter (MF) procedure was used for total coliform detection in this study for three reasons. One, larger volumes (100-ml portions) of distributed water could be examined than with the MPN technique; two, the MF procedure yields more precise results; and three, less processing time would be involved per sample, so reexamination of many of the samples could have been made within the 30-hour time limit if required. All potable and source water samples were examined for total coliforms using M-Endo MF broth, incubated at 35°C for 20-24 hours. Because raw water quality varied with its source, three decimal sample portions were filtered, the volume being determined by the estimated water quality.

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* Standard Methods for the Examination of Water and Wastewater, 12th Ed., APHA, AWWA, and WPCF. American Public Health Assoc. New York, N. Y., 1965, 796 pp.

Any coliform colonies detected in the examination of a sample were further verified by transfer to phenol red lactose for 24- and 48- hour periods at 35°C incubation. All positive phenol red lactose broth tubes then were confirmed in brilliant green lactose at 35°C for verification of total coliforms and in EC medium at 44.5°C for detection of fecal coliforms. This procedure further confirmed the standard total coliform MF test and supplied additional information on the potentially hazardous occurrence of fecal coliform in those potable water supplies.

Basic knowledge was also needed on the general bacterial population of potable water. Therefore, the general population of bacterial count (plate count) was also made on all distribution system samples. Sample portions of 1 ml and 0.1 ml in plate count agar (Tryptone-Glucose-Yeast Agar), incubated 48 hours at 35°C were sufficient to yield the desired data.

## Chemical

The five samples, as noted above, taken to determine the chemical quality of the finished and/or distributed water were analyzed as follows:

Sample 2.a., General Chemistry.

These constituents were generally determined by Standard Methods, except as listed below.

### Barium

No standard method existed at the time this study was undertaken. An atomic absorption procedure, which will appear in the next edition of Standard

Methods, was used and was found acceptable. The analysis was made only on those samples that had less than 2 mg/l because above that concentration the barium precipitates out of solution.

### Chloride

A variation of the potentiometric titration procedure was used, which is a tentative method in Standard Methods, page 732. Rather than titrate with silver nitrate to a specified end-point in millivolts, using a glass electrode and a silver-silver chloride electrode, a standard curve was prepared that related millivolts to chloride concentration. The concentration of an unknown is then determined from the standard curve. The procedure was just as accurate as the fitration method and was simpler to carry out.

### Fluoride

A fluoride electrode method, which will appear in the next edition of Standard Methods, was used. Precision and accuracy was generally better than any other method and the method was simpler to carry out.

Sample 2.b. Trace Metals

The atomic absorption spectrophotometer method was used for all heavy metals (cadmium, chromium, copper, iron, lead, manganese, silver, zinc, nickel, and cobalt) because its sensitivity, specificity, simplicity and speed of analysis far exceeded the usual wet chemical methods. An atomic absorption method for these metals will appear in the next edition of Standard Methods.

Sample 2.c. Radioactivity

These radiological constituents were determined using standard radiological counting techniques.

Sample 2.d. Pesticides

No standard procedure for pesticide determinations existed at the time the CWSS was undertaken. Gas chromatography is generally the accepted method of analysis and will appear in the next edition of Standard Methods. Therefore, this technique was used.

Sample 2.e. Organics (CCE and CAE)

These organic constituents were determined using standard extraction techniques.

## VI. A. CHLORINATED WATER SYSTEMS

Section 5.20 of Chapter I of the New York State Sanitary Code states "Minimum treatment for a water supply obtained in whole or in part from a surface water shall be disinfection...." In the whole New York Standard Metropolitan Statistical Area, only one supply serving 115 people was in violation of the section. However, in Suffolk County, six well systems serving 24,265 have been ordered to chlorinate due to high bacteriological results for distribution system samples. Any system in Suffolk County having a high bacteriological result is ordered to chlorinate immediately. When the trouble is found and eliminated, chlorination may be stopped upon a series of negative results. However, upon a recurrence of positive results continuous chlorination is required, even when the trouble has been eliminated and a series of negative results obtained.

Table 4 summarizes the information obtained on chlorination during the Community Water Supply Study. The most pertinent fact to be realized from this summary is that 92.5% of the population in the New York SMSA is served by chlorinated water systems.

Although the State Sanitary Code does not specifically require chlorination of ground water systems, it should be noted that 38 systems serving 2,207,525 from ground water are chlorinated.

## TABLE 4

## CHLORINATED WATER SYSTEMS

| | Total Number Systems | Total Pop Served | Chlorinated | | Chlorination* Not Required By NYSHD | | Not Chlorinating Violates NYS Sanitary Code | |
|---|---|---|---|---|---|---|---|---|
| | | | Systems | Pop Served | Systems | Pop Served | Systems | Pop Served |
| Rockland | 36 | 211,571 | 10 | 194,415 | 25 | 17,041 | 1 | 115 |
| Westchester | 54 | 921,850 | 42 | 914,991 | 12 | 6,859 | - | - |
| Nassau | 45 | 1,419,789 | 15 | 837,960 | 30 | 581,829 | - | - |
| Suffolk | 71 | 902,206 | 9 | 674,530 | 56 | 203,411 | 6 | 24,265** |
| SUB-TOTAL | 206 | 3,455,416 | 76 | 2,621,896 | 123 | 809,140 | 7 | 24,380 |
| New York City*** | 3 | 7,965,000 | 3 | 7,965,000 | - | - | - | - |
| TOTAL | 209 | 11,420,416 | 79 | 10,586,896 | 123 | 809,140 | 7 | 24,380 |

FOR ROCKLAND, WESTCHESTER, NASSAU AND SUFFOLK COUNTIES ONLY

| | |
|---|---|
| Percentage of systems with chlorination | 36.5% |
| Percentage of population served on systems with chlorination | 76.0% |

FOR SMSA

| | |
|---|---|
| Percentage of systems with chlorination | 37.8% |
| Percentage of population served on systems with chlorination | 92.5% |

*Chapter I, Part 5, Section 5.20 of the New York State Sanitary Code does not specifically require chlorination of public drinking water where the source is from wells.

**County Health Department has ordered chlorination for these six well systems.

***New York City Health Code requires chlorination of all systems.

## VI. B. STATE LICENSING OF OPERATORS

Table 5 summarizes the status of the New York State Water Treatment Plant operator licensing program in the New York Standard Metropolitan Statistical Area that existed during the Community Water Supply Study. That 97.5% of the population served was by systems with correctly listed operators, clearly reveals the success of the program. Only 27 systems serving 130,425 were in violation of the New York State Sanitary Code, in that either the operator was not licensed or his grade was below that required. A good portion of the success of this program is due to the training programs available to water supply personnel. The following section describes the state and county programs, while Table 6 lists the licensing requirements.

### New York State Training and Licensing Programs

The Public Health Council of the State of New York mandated qualifications for water and sewage treatment plant operators in 1937. These have been changed from time to time, with the last major revisions made in 1963. The present requirements provide for eight classifications within the three grades of operators (I, II and III) depending on the type of treatment provided and the design capacity of the plant. This is summarized along with

## TABLE 5

## WATER TREATMENT PLANT OPERATOR LICENSING

| | Total Number Systems | Total Pop Served | Licensed Operator | | No Treatment Licensed Operator Not Required | | *Non-Licensed Operator Violation of NYS State Sanitary Code | |
|---|---|---|---|---|---|---|---|---|
| | | | Systems | Pop Served | Systems | Pop Served | Systems | Pop Served |
| Rockland | 36 | 211,571 | 6 | 200,600 | 27 | 10,756 | 3 | 215 |
| Westchester | 54 | 921,850 | 28 | 831,278 | 18 | 59,247 | 8 | 31,325 |
| Nassau | 45 | 1,419,789 | 39 | 1,405,819 | 5 | 8,170 | 1 | 5,800 |
| Suffolk | 71 | 902,206 | 21 | 737,865 | 35 | 71,256 | 15 | 93,085 |
| SUB-TOTAL | 206 | 3,455,416 | 94 | 3,175,562 | 85 | 149,429 | 27 | 130,425 |
| New York City | 3 | 7,965,000 | 3** | 7,965,000 | - | - | - | - |
| TOTAL | 209 | 11,420,416 | 97 | 11,140,562 | 85 | 149,429 | 27 | 130,425 |

### FOR ROCKLAND, WESTCHESTER, NASSAU AND SUFFOLK COUNTIES ONLY

| | | | |
|---|---|---|---|
| Percentage of systems with licensed operator | 45.6% | Non-licensed operator-violation | 13.1% |
| Percentage of population served by systems with licensed operator | 92.0% | Non-licensed operator-violation | 3.8% |

### FOR SMSA

| | | | |
|---|---|---|---|
| Percentage of systems with licensed operator | 46.4% | Non-licensed operator-violation | 12.9% |
| Percentage of population served by systems with licensed operator | 97.5% | Non-licensed operator-violation | 1.4% |

*Includes operator with license, but not meeting level for degree of treatment or size of plant.

**While New York City is under a separate code, supervision of facilities is by state licensed professional engineers.

## TABLE 6

| Type of plant | Type of treatment | Plant capacity designated by Health Dept. million gallons per day | Required minimum grade | | Sec. no. | Required basic education | Required special training course | Required type and duration of operating experience |
|---|---|---|---|---|---|---|---|---|
| | | | Oper. | Asst. Oper. | | | | |
| A * | Filtration with pretreatment or chemical softening process | Greater than 2.5 | I-A | | 11.65 | Bachelor of science degree | Appropriate approved course | One year operating experience at a plant with facilities equivalent to Type A plant, with ability to make necessary tests. |
| | | | | II-A | 11.66 | High school or high school equivalency diploma | Appropriate approved course | One year operating experience at a plant with facilities equivalent to Type A plant, with ability to make necessary tests. |
| | | 2.5 or less | II-A | | | | | |
| | | | | III-A | 11.67 | High school or high school equivalency diploma | Appropriate approved course | Six months operating experience at a plant with facilities equivalent to Type A plant, with ability to make necessary tests. |
| B** | Chlorination or Chlorine-Dioxide or Chlorine-Ammonia or Dechlorination or Fluoridation | Greater than 4.0 | I-B | | 11.68 | Bachelor of science degree | Appropriate approved course | Six months operating experience at a plant with facilities equivalent to Type B plant, with ability to make necessary tests. |
| | | | | II-B | 11.69 | High school or high school equivalency diploma | Appropriate approved course | Six months operating experience at a plant with facilities equivalent to Type B plant, with ability to make necessary tests. |
| | | 1.0-4.0 | II-B | | | | | |
| | | | | III-B | 11.70 | High school or high school equivalency diploma | Appropriate approved course | Three months operating experience at a plant with facilities equivalent to Type B plant, with ability to make necessary tests. |
| | | Less than 1.0 | III-B | III-B | | | | |

* Persons qualified in grade III-A are not required for operation of plants requiring a grade I-A operator.
** Persons qualified in grade III-B are not required for operation of plants requiring a grade I-B operator.

| Type of plant | Type of treatment | Plant capacity designated by Health Dept. million gallons per day | Required minimum grade | | Sec. no. | Required basic education | Required special training course | Required type and duration of operating experience |
|---|---|---|---|---|---|---|---|---|
| | | | Oper. | Asst. Oper. | | | | |
| C | Filtration without pretreatment or chemical feed or ion exchange or Fe & Mn removal | Greater than 7.5 | II-C | | 11.71 | High school or high school equivalency diploma | Appropriate approved course | Six months operating experience at a plant with facilities equivalent to Type C plant, with ability to make necessary tests. |
| | | | | III-C | 11.72 | High school or high school equivalency diploma | Appropriate approved course | One month operating experience at a plant with facilities equivalent to Type C plant, with ability to make necessary tests. |
| | | 7.5 or less | III-C | III-C | | | | |

educational and experience requirements in Table 8, which is from Chapter I of the New York State Sanitary Code.

Training course curriculums have been approved for the grade II and grade III operators by the Public Health Council. Extensive well-written manuals have been prepared for these two grades. No curriculum has been developed for the training of grade I operators because of the limited number of individuals who apply in any one year. The Office of Environmental Health Manpower of the State Health Department sponsors courses at Syracuse University, New York University, and State University College at Buffalo. During 1969, six courses were conducted for those desiring grade II certification. The number of men who attended these courses was 112, making a total of 1120 man-days of instruction. Four courses were held during the year for those desiring grade III certification, which 62 men attended. This constituted 310 man-days of instruction. In-service courses in topics such as chemistry, laboratory analysis, and pumps are also offered.

In anticipating future needs, there are several areas in which the Office of Environmental Health Manpower would like to increase its efforts.

(1) An expected increase in the large complete water

treatment plants, which will eventually be needed as water sources of lower quality are used, clearly points out the need for more grade I operators. Under present requirements, a college training program of some sort is needed. A solution might be a grant program for the co-operative education of operators at two year technical institutes and community colleges.

(2) Another concern is the shortage of college engineers in the water supply field. This might be overcome by a joint program in which undergraduate engineers are employed in state health department offices, central or field. It would be hoped that such a program would interest more engineers to make a career in the water supply field.

(3) A manual of Laboratory Procedures for Wastewater Treatment Plant operators was recently published. Funds should be made available for the development and publishing of a similar manual for water supply treatment plant operators.

The Health Department would also like to have more funds and staff for presenting courses for engineers and sanitarians working in the regional and local offices. Such refresher courses are definitely needed to provide a mechanism for keeping personnel apprised of latest developments. Funds and staff are needed to do this job adequately.

## County Training Program

The Nassau and Suffolk County Health Departments twice each year run a joint Water Treatment Plant Operators School. Teaching personnel is mainly from county staff. In general, the course is presented for plant operators within the counties and new county staff personnel. Attendance at the five-day course runs between 30 and 40 students. The curriculum is directed towards preparing the operators for taking their examinations for state licenses.

The Westchester County Department of Health schedules its annual Water Treatment Plant Operators School in the Spring. When openings are available, attendance from neighboring counties, including Rockland, are welcomed.

## VI. C. APPROVED LABORATORIES

The following table summarizes the data obtained during the Community Water Supply Study relative to the bacteriological testing being done by a state approved laboratory. This information was checked later with the County Health Departments. In many cases, the purveyor was not sure as to the current status of the laboratory handling his testing and the results.

| | Total | | Analyses By Approved Laboratory | |
|---|---|---|---|---|
| | Systems | Pop Served | Systems | Pop Served |
| Rockland | 36 | 211,571 | 35 | 211,538 |
| Westchester | 54* | 921,850 | 54 | 921,850 |
| Nassau | 45 | 1,419,789 | 45 | 1,419,789 |
| Suffolk | 71 | 902,206 | 69 | 281,266 |
| SUB TOTAL | 206 | 3,455,416 | 203 | 2,834,443 |
| New York City | 3 | 7,965,000 | 3 | 7,965,000 |
| TOTAL | 209 | 11,420,416 | 206 | 10,799,443 |
| (% of Total 4 Counties) | | | (97.5%) | (82.0%) |
| (% of Total SMSA) | | | (98.5%) | (94.5%) |

*30 serving 818,251 purchase water from New York City or from New York City through another system. 13 of the 30 supplies also have their own sources as a supplement or standby.

Table 7 was prepared on the basis of additional data supplied by the Health Departments.

### Bacteriological Sampling

In order to meet Public Health Service requirements, the 209 systems in the New York Standard Metropolitan Statistical Area would have to collect annually 57,279 samples. To meet New York State's requirements, 34,063 samples would have to be collected. This does not include any additional check or investigation sampling. Of the 209 supplies, 18 met the Public Health Service requirement and 57 New York State. The 57 systems meeting the New York State requirement served 10,420,394 people. The remaining 152 systems had a deficiency of 5,022 samples, an average of less than three per supply per month. This requirement by New York State had been in effect only 23 months prior to the initiation of the Community Water Supply Study, and less than 12 months prior to the period recorded.

## COMMENTS

### Bacteriological Sampling and Laboratories

Prior to the initiation of the Community Water Supply Study in Region II, contact with state water supply personnel in all four states of the region indicated a concern over bacteriological sampling and approval of laboratories. During the CWSS, county and municipal staffs, as well as the utilities themselves, expressed their concern over the need.

## TABLE 7

## BACTERIOLOGICAL SAMPLING FREQUENCY

(12 Month Period)

| | Number of Systems | Population Served | Number of Samples Required (12 Mos) | | Number of Systems Meeting | | Population Served by Systems Meeting | Number of Samples Deficient from (12 Mos) |
|---|---|---|---|---|---|---|---|---|
| | | | PHS Stds | NYS Stds | PHS Stds | NYS Stds | NYS Stds | NYS Stds |
| Rockland | 36 | 211,571 | 2,676 | 1,728 | 0 | 0 | 0 | 677 |
| Westchester | 54 | 921,850 | 11,665 | 6,410 | 5 | 18 | 664,980 | 1,716 |
| Nassau | 45 | 1,419,789 | 19,460 | 9,401 | 10 | 33 | 1,112,319 | 597 |
| Suffolk | 71 | 902,206 | 12,618 | 7,224 | 1 | 3 | 678,095 | 2,013 |
| SUB-TOTAL | 206 | 3,455,416 | 46,419 | 24,763 | 16 | 54 | 2,455,394 | 5,022 |
| New York City | 3 | 7,965,000 | 10,860 | 9,300 | 2 | 3 | 7,965,000 | 0 |
| TOTAL | 209 | 11,420,416 | 57,279 | 34,063 | 18 | 57 | 10,420,394 | 5,022 |

The validity of the basis for the number of samples to be collected was questioned by many. It is quite apparent that a clear and easily understood documentation of the statistical relationship of risk to human health and size of water supply is needed.

In the NYSMSA, almost every aspect of water system may be found. In New York City we have one extreme, the large densely populated metropolitan area, while in Rockland and Suffolk we find the opposite, rural areas with fast encroaching suburbia. For both the Public Health Service and New York State Drinking Water Standards, the New York City system is off the Minimum Number of Samples per Month curve. The figure of 500 per month or 6000 per year is used; however, the two city laboratories pick up over 11,000 samples per year. The Department of Water Resources picks up about 55% of these at their special sampling stations, while the City Health Department collects the remaining 45%. These two departments carefully coordinate their efforts to insure complete coverage of the city, especially in areas of potential problems. Consideration might be given to this procedure for sampling criteria; i.e., a minimum number of samples to be collected with the local responsible agencies, health and utility, determining where past records or conditions indicate additional sampling as desirable.

In Rockland, Westchester, and Suffolk Counties, the bacteriological sampling falls short of that required to meet New York State standards. This is due to four factors; namely, geography, numerous small supplies, number of available approved laboratories, and insufficient sampling staff. While the foregoing factors make it quite difficult for the three counties to meet requirements, each has taken steps to comply or provide as much protection as possible. Suffolk County has made the purveyor entirely responsible, using the county laboratory facilities for checking. Westchester and Nassau Counties, while requiring the purveyor to be responsible, will assist as necessary through their laboratory facilities. Rockland County does not have its own facilities and contracts with Westchester. On the basis of their contact with the Westchester County Laboratory, a minimum sampling schedule has been set up for the remaining systems. This includes one sample per month for supplies serving less than 100, two samples per month for systems serving 100 to 5,000. For schools and camps, one sample per month is collected during the operating period.

One item discussed frequently was the presentation of sampling requirements on double-log paper. For those not familiar with it, double-log paper presents a problem. A listing by population, size, and number of samples required might not look as scientific, but it would be a lot easier to use and would eliminate disagreements.

Consideration should also be given to improving the presentation of the limits for coliform organism as set forth in Section 3.2 of the Drinking Water Standards. While this might not be a simple task, efforts should be made in order to assist those who have to make use of the standards in the field.

## Laboratories

In the NYSMSA, at the time of the Community Water Supply Study, there were ten laboratories that had been approved by the State Commissioner of Health for both bacteriological and chemical examination of water. Four additional laboratories had been approved for bacteriological examination only, while one had been approved for only chemical examination. Approval of one laboratory for both categories was pending.

The approved laboratories appear to be fairly evenly divided over the entire SMSA.

## VI. D. CHEMICAL ANALYSIS

The data collected on the inventory from ECA 9 relative to chemical analysis is summarized in the following table. This data was updated on the basis of county records.

| | Total | | Chemical Analysis | |
|---|---|---|---|---|
| | Systems | Pop Served | Systems | Pop Served |
| Rockland | 36 | 211,571 | 16 | 208,020 |
| Westchester | 54* | 921,850 | 50 | 919,562 |
| Nassau | 45 | 1,419,729 | 43 | 1,419,519 |
| Suffolk | 71 | 902,206 | 64 | 899,436 |
| SUB-TOTAL | 206 | 3,455,416 | 173 | 3,446,537 |
| New York City | 3 | 7,965,000 | 3 | 7,965,000 |
| TOTAL | 209 | 11,420,416 | 176 | 11,411,537 |
| (% of Total SMSA) | | | (85.5%) | (99.5%) |
| (% of Total 4 Counties) | | | (84.3%) | (99.6%) |

*30 systems serving 818,251 purchase water from New York City or from New York City through another system. 13 of the 30 systems also have their own sources as a supplement or standby.

In many cases, the utility did not know if such an analysis had been performed by the testing laboratories. While records were available in the county files, it would be better if the utilities were informed of all results rather than just when limits were exceeded. While the above summary shows a good record for both number of supplies with chemical analysis and population served by these systems, it was found that in many cases for smaller supplies, the minimum requirements of the State Sanitary Code were not being met.

With all the chemical wastes being discharged to both surface and ground water today, it is imperative that the code requirements be complied with.

## VI. E. RADIOLOGICAL ANALYSIS

The following data on radiological analysis was collected on ECA inventory form 19.

| | Total | | Radiological Analysis | |
|---|---|---|---|---|
| | Systems | Pop Served | Systems | Pop Served |
| Rockland | 36 | 211,571 | 4 | 175,360 |
| Westchester | 54* | 921,850 | 31 | 844,931 |
| Nassau | 45 | 1,419,729 | 3 | 79,000 |
| Suffolk | 71 | 902,206 | 0 | 0 |
| SUB-TOTAL | 206 | 3,455,416 | 38 | 1,099,291 |
| New York City | 3 | 7,965,000 | 2 | 7,840,000 |
| TOTAL | 209 | 11,420,416 | 40 | 8,939,291 |
| (% of Total 4 Counties) | | | (18.4%) | (31.8%) |
| (% of Total SMSA) | | | (19.1%) | (78.2%) |

*30 systems serving 818,251 purchase water from New York City or from New York City through another system. 13 of the 30 systems also have their own sources as a supplement or standby.

While the amount of testing done on this item is low, most health officials feel it is sufficient to have background data and then develop a minimum surveillance program for their area. With the exception of Rockland and Suffolk Counties, this procedure was being followed. Rockland County unfortunately does not have its own laboratory; however, the one large supply serving about 85% of the population over most of the county does do radiological analysis. Suffolk County, on the other hand, has excellent laboratory facilities, but was unable to hire personnel. This situation was corrected recently. These counties were happy to have the CWSS data as a base. All CWSS Radiological tests results for the entire SMSA were well within the limits.

## VI. F. SANITARY SURVEYS

The data obtained on the ECA 19 inventory form and corrected by the health departments relative to Sanitary Surveys shows a large percentage of the population served was covered but only about 64% of the water supply systems. Data collected during the study indicate only that some kind of survey was made, but do not cover survey results or adequacy. This information is summarized below:

| | Total | | Sanitary Survey | |
|---|---|---|---|---|
| | Systems | Pop Served | Systems | Pop Served |
| Rockland | 36 | 211,571 | 8 | 208,620 |
| Westchester | 54* | 921,850 | 42 | 914,327 |
| Nassau | 45 | 1,419,729 | 45 | 1,419,729 |
| Suffolk | 71 | 902,206 | 37 | 804,330 |
| SUB TOTAL | 206 | 3,455,416 | 132 | 3,347,006 |
| New York City | 3 | 7,965,000 | 2 | 7,890,000 |
| TOTAL | 209 | 11,420,416 | 134 | 11,187,006 |
| (% of Total 4 Counties) | | | (64.0%) | (97.0%) |
| (% of Total SMSA) | | | (64.0%) | (97.9%) |

*30 systems serving 818,251 purchase water from New York City or from New York City through another system. 13 of the 30 also have their own sources as a supplement or standby.

Thus, it is quite evident that there is a great need for clarification as to Sanitary Surveys. Most textbooks are found to be non-specific and often vague. A manual of recommended criteria that covers all phases of public water supply systems should be developed in order that this confusion be eliminated as much as possible.

For individual water supply systems, outlines for sanitary surveys are presented in Public Health Service Bulletin No. 24 (Revised 1962), Manual of Individual Water Supply Systems and New York State Department of Health bulletin entitled Rural Water Supplies.

## VI. G. CROSS-CONNECTION PROGRAM

The following summary was prepared on the basis of the information obtained for the ECA 19 inventory form.

| | TOTAL | | CROSS-CONNECTION | | | |
|---|---|---|---|---|---|---|
| | | | Code | | Active Program | |
| | Systems | Pop Served | Systems | Pop Served | Systems | Pop Served |
| Rockland | 36 | 211,571 | 9 | 186,400 | 1 | 15,000 |
| Westchester | 54* | 921,850 | 29 | 830,753 | 16 | 629,578 |
| Nassau | 45 | 1,419,729 | 39 | 1,284,619 | 10 | 310,225 |
| Suffolk | 71 | 902,206 | 27 | 731,966 | 2 | 6,500 |
| SUB TOTAL | 206 | 3,455,416 | 104 | 3,033,738 | 29 | 961,303 |
| New York City | 3 | 7,965,000 | 3 | 7,965,000 | 3 | 7,965,000 |
| TOTAL | 209 | 11,420,416 | 107 | 10,998,738 | 32 | 8,926,303 |
| (% of Total 4 Counties) | | | (50.5%) | (87.7%) | (14.0%) | (27.8%) |
| (% of Total SMSA) | | | (51.3%) | (96.0%) | (15.4%) | (78.1%) |

* 30 systems serving 818,251 purchase water from New York City or from New York City through another system. 13 of the 30 supply systems also have their own sources as a supplement or standby.

It is hard to evaluate the data, since the views as to just what constitutes a valid cross-connection program varied widely among those interviewed. Where there wasn't a local code, a yes was given if the state code was enforced. The drop from 107 utilities following codes to only 32 active programs already in effect indicates a one shot proposition, probably a check of the plans and specifications or a check of the constructed facilities, but no continuous follow-up.

In view of the foregoing, the following discussion was prepared based on one to two days visits to four of the supply systems serving over 100,000 in the SMSA. Appendix B contains four each county and New York City a statement and summary prepared by the Public Health Service engineer after his visit.

The cross-connection programs for the water supply systems in the New York City SMSA, although better than the average across the country, still appear to be the area to be most concerned with. In general, the purveyors used the New York State Plumbing Code, Bulletin 23, when there wasn't a local code for new construction. However, relative to a continuing program, very few indicated that one actually existed.

This situation was also evident for the larger supply systems (9) with a day or two spent on each one reviewing their program. Where available, a hospital, sewage treatment plant, and metal plating plant were visited.

The New York State Health Department's Division of Hospital Review and Planning in their review for hospital construction grants carefully checks for cross-connection and possible back-siphonage. This program seems to have created an awareness of the problem. Visiting the hospitals, it was found that the use of such devices as vacuum breakers, air gaps, back flow preventors, and swing connections seemed to be well understood by those in charge and the workers. Some hospitals had their maintenance men carry vacuum breakers in their kits for use when they ran across an installation where the device had been removed. This removal seemed to be most prevalent in laboratories where the technicians did their own plumbing. An effort was made to find the culprit and explain the reasons for such a device. One hospital talked of using posters on cross-connection hazards similar to those developed for fire hazards.

The need for prevention of contamination of public water systems by sewage treatment plants was well understood by all treatment plant personnel contacted. The New York State grant programs, which pays 30% of the annual cost of maintenance and operation awarded on the basis of an annual inspection that includes cross-connection control, is responsible for creating this awareness.

However, in spite of both of these programs, problems were found at both hospitals and sewage treatment plants.

Unlike the foregoing, metal plating plants presented the same dismal picture that exists across the country. Only at one plant, in New Rochelle, was a proper device installed that not only protected the water supply but also the plant workers.

It is unfortunate that it was not possible to visit other industries such as meat plants, mortuaries, chemical plants, et cetera for a more complete picture.

Another critical situation relative to a cross-connection program arises when the activity is divided between different departments. When each one knows its job, things are fine, but when the building department thought the health department was handling a certain phase, and the health department thought the water company was taking care of it, while the water company was sure the building department was doing the job, there might as well not be a program. This situation actually happened and proved to be quite embarassing to all concerned.

New York City

Meetings with New York City Health and Water Resources Department staff revealed quite an extensive program. Appendix B.3.h. contains a brief outline of the program carried on by the Divsiion of Water Control in the Department of Health along with a description of activities by other City agencies. However, in spite of all this activity some staff members questioned whether they were doing enough and, if not, what more they should be doing and how should it be done. They would like to see some kind of priority system developed to serve as a guide for effort to be spent on cross-connection work relative to all phases of water supply.

## State

At the State level the cross-connection program is administered in accordance with Chapter I, Part 5, Section 5.33 of the State Sanitary Code. Plans and specifications are reviewed by the State Commissioner of Health for hazardous physical connections in connection with the Sanitary Code and Environmental Health Manual, Items 133.0 - 133.5. The Water Works Section provides technical and administrative assistance to local health departments and water supply systems regarding control operations, surveys, rules, regulations, ordinances, divices, et cetera. The section is also actively promoting "control by containment" in order to insure protection of supply systems.

## Federal

In the past, the Public Health Service's assistance has been limited due to lack of funds and staff. Public Health Service Publication No. 957, entitled "Water Supply and Plumbing Cross-Connections," is an excellent booklet and is used by many. However, for the past year, owing to the lack of funds, copies have not been available for distribution by the regional office. Region II alone needs over 1,000 copies each year. Had they been available, the Community Water Supply Study would have provided an excellent opportunity to insure copies were placed in the hands of those responsibie. This alone would have created an awareness of the problem in many areas where it is needed.

While a few water purveyors are doing something, few are doing all that they should; and many are doing very little or nothing because of the lack of staff and/or funds. A countrywide education program informing the general public of the potential hazards, the methods of elimination, and the costs could greatly assist purveyors in developing effective cross-connection programs.

The Public Health Service in cooperation with the State should develop suggested programs for various size water utilities.

As mentioned previously, a priority system should be developed relative to the importance of cross-connection programs and other programs a water utility must maintain.

Updating of Publication No. 957 should be considered. Chapter 2: Public Health Significance of Cross-Connection has examples between 1944 and 1962. On this basis one might conclude that in the last eight years nothing has happened and thus there is also nothing to worry about. New devices and more cases might add to the publications effectiveness. There is also some question as to the competence of Chapter 8, which presents an ordinance. Maybe the section on cross-connections from the National Plumbing Code should be included.

A cooperative effort by the State Health Departments and the Public Health Service in developing programs that will assist purveyors might provide the step needed to assist in elimination of one of the greatest potential hazards to public health.

## VI. H. FLUORIDATION

On a population basis, 70.5% of people on public water systems in the NYSMSA are receiving fluoride. On this basis, the program may be considered quite successful. However, based on the number of systems fluoridating, the program could be considered unsuccessful. Only 18 systems out of 209 in the New York SMSA are receiving fluoride.

One reason for this situation is the many different point sources that would require equipment and maintenance. A good example of this problem may be seen in the Suffolk County Water Authority system. In spite of some grouping of wells, the systems' 300 wells would require 250 separate fluoridating units. The capital, maintenance, and operation costs for such a program would be quite high in spite of the 618,000 persons served. This is a situation which exists throughout Rockland, Nassau and Suffolk counties. Solutions are not obvious, but the Public Health Service would do well to investigate all possibilities and document them for use by the local health officials in their programs for encouraging and assisting purveyors.

### SUMMARY

| | |
|---|---|
| Total SMSA population served by public water supply systems | 11,420,416 |
| Total SMSA population on supply systems with fluoridation | 8,048,102 |
| SMSA population on supply systems with no fluoride added | 3,372,314 |
| Four county population served by public water supply systems | 3,455,416 |
| Four county population on supply systems with fluoridation | 758,102 |
| Four county population on supply systems with no fluoride added | 2,697,314 |
| Total number of supply systems | 209 |
| Supply systems receiving fluoride | 18 |
| Supply systems adding fluoride with own equipment | 10 |
| Supply systems served entirely by another supply system which is fluoridating | 8 |
| Supply systems serviced in part by another supply system which is fluoridating | 3 |

## Table 8

## FLUORIDATION

| TEMPERATURE | Lower | Optimum | Upper |
|---|---|---|---|
| 58.4° - 63.8°F | 0.8 | 1.0 | 1.3 |

| | Number of Samples | Range | Number Outside | Value | Population Served |
|---|---|---|---|---|---|
| New York City **(1 system)** | | | | | |
| NYC-1 (V) | | | | | |
| Manhattan | 17 | 0.67 - 0.98 | - | | |
| Richmond | 11 | 0.85 - 0.96 | | | |
| Bronx | 18 | 0.90 - 1.02 | | | |
| Queens | 12 | 0.64 - 1.05 | | | |
| Kings | 18 | 0.92 - 1.05 | - | | |
| | 76 | 0.64 - 1.05 | | | 7,290,000 |
| Nassau (2 systems ) | | | | | |
| N-4(V) | 2 | 0.63 - 0.70 | 2 | <0.1,<0.1 | 10,842 |
| N-17(V) | 7 | 0.64 - 0.98 | - | | 48,400 |
| | 9 | 0.63 - 0.98 | 2 | | 59,242 |
| Westchester (15 systems ) | | | | | |
| W-16 (NYC) | 2 | 0.90 - 0.95 | | | 5,200 |
| W-18 (NYC) | 6 | 0.87 - 0.98 | | | 45,000 |
| W-20 (NYC) | 2 | 0.98 - 0.98 | | | 3,500 |
| W-22 (NYC) | 2 | 0.57 - 1.05 | | | 5,000 |
| W-28 (NYC, V) | 3 | 1.00 - 1.10 | | | 6,860 |
| W-37,38 (NYC, V) | 11 | 0.76 - 1.00 | | | 168,000 |
| * W-41 **(W37,38)** | 2 | 0.85 - 0.85 | | | 2,000 |
| W-43 (V) | 4 | 0.72 - 0.84 | 1 | <0.1 | 7,000 |
| W-45 (V) | 6 | 0.87 - 0.95 | | | 45,300 |
| * W-47 (V)(W37,8) | 3 | 0.93 - 1.05 | | | 22,000 |
| W-56 (NYC) | 2 | 0.90 - 0.95 | | | 8,000 |
| W-57 (NYC) | 4 | 0.82 - 1.00 | | | 60,000 |
| W-60 ( V) | 1 | 0.76 | 3 | <0.1,<0.1, 2.6 | 28,000 |
| W-63 (NYC) | 8 | 0.84 - 1.00 | | | 78,000 |
| W-71 (NYC, V ) | 9 | 0.91 - 0.95 | | | 215,000 |
| | | | | | 698,860 |

KEY

| | |
|---|---|
| (NYC) | Fluoridated by New York City<br>On New York City System plus own source |
| (NYC , V) | **Being fluoridated by New York City and own equipment** |
| (V) | **Being fluoridated by own equipment only ,** |

*** W-41** **Served by W-37,38**
**W-47** **Served partially by W-37,38**

**Note: Fluoride concentrations are expressed in milligrams per liter**

## VI. I. PESTICIDES

During the Community Water Supply Study for the New York Standard Metropolitan Statistical Area a total of 46 pesticide samples were collected for 38 water supply system. Of these 38 systems no pesticides were detected in two using surface sources and 14 using ground sources. The following table summarizes the results of those systems in which traces of the ten pesticides tested for were found.

| | | Surface Water 18 Systems | | | Ground Water 4 Systems | | |
|---|---|---|---|---|---|---|---|
| Pesticides | Limit ppb | No. of Samples with trace | Maximum Value ppb | Remarks | No. of Samples with trace | Maximum Value ppb | Remarks |
| Aldrin | 17 | - | - | - | 3 | <0.1 | All <0.1 |
| Chlordane | 3 | 5 | <0.1 | All <0.1 | - | - | - |
| DDT[2] | 42 | 14 | <0.1 | All <0.1 | - | - | - |
| Dieldrin | 17 | 1 | <0.1 | - | 1 | <0.1 | - |
| Endrin | 1 | 6 | <0.1 | All <0.1 | 1 | <0.1 | - |
| Heptachlor | 18 | 3 | 0.2 | 0.2, 0.1 | - | - | - |
| Heptachlor-epoxide | 18 | 3 | 0.1 | All <0.1 | - | - | - |
| Lindane | 56 | 9 | 0.2 | .16,<0.1 | - | - | - |
| Methoxychlor | 35 | - | - | - | - | - | - |
| Toxaphene | 5 | - | - | - | - | - | - |

Although none of the samples had more than trace amounts and in no degree approached the limit, the fact that they were found indicates a possible future problem. In Chapter VII, E., it is pointed out that with the exception of lawn and termite control very few of the constituents tested are now being used.

## VI. J. CARBON ADSORPTION TECHNIQUE

For the past ten years the carbon adsorption technique has been the most widely used procedure for measuring organic contaminants in water. The following section, from a Public Health Service Publication now being prepared, provides an indication as to just what substances the carbon chloroform extract (CCE) method measures.

> "Specific compounds that have been identified, using the carbon adsorption technique, include the following: alpha-conidendrin; ortho-nitro-chlorobenzene; phenyl ether; ABS detergents; non-ionic detergents; 2-ethylhexyl phthalate; dieldrin; endrin; DDT; DDE; DDD; aldrin; heptachlor; heptachlor epoxide; BHC; parathion; methyl parathion; malathion; sevin; thioden; chlordane; telodrin; technical and gamma-chlordane· bis-(2-chlorethyl) ether; bis-2-Chloreiso-propyl) ether; naphthalene; tetralin; styrene; acetophenone; ethyl benzene; 2-ethyl hexane; diisobutyl carbinol; phenyl methyl carbinol; and 2-methyl-5-ethyl pyridine. Components that have been detected but not specifically identified, include nitriles, amines, phenols, acids, ketones, aldehydes, and alcohols."

It should be kept in mind that the carbon filter measures quality and quantity on a gross basis only. While quite a few of the foregoing substances can be measured individually, the majority cannot. In addition to these there are many new chemicals being developed each year. If conventional treatment* removes only a small portion** of the trace metals, which have been known and measured for years, how much and how many of the new chemical wastes are being removed?

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* As defined in the Report of the National Technical Advisory Committee to the Secretary of the Interior, April 1, 1968, entitled "Water Quality Criteria" (Continued on next page)

** See Chapter VI, Section F. 3.)

Large plant size carbon filters are in use at some water treatment plants, and have proven effective, however, their use, has not been extensive.

During the Community Water Supply Study, 35 carbon filters were installed on finished water. Twelve of these were on ground water systems. Of the 23 surface systems on which carbon filters were installed, three exceeded the Carbon Chloroform Extract (CCE) limit of 200 ppb. The remaining 20 had values ranging from 8 to 192, with an average of 102 ppb. For 15 of these 20 systems, treatment was mainly chlorination, with some chemicals added for corrosion control and pH adjustment. The three systems which had high values of 313, 409, and 455, had fairly complete treatment plants; pre-chlorination, chemicals, coagulation mixing, sedimentation, filtration, chlorination, chemicals, and in some cases aeration or activated carbon.

In the Report of the National Technical Advisory Committee to the Secretary of the Interior, April 1, 1968, entitled "Water Quality Criteria," Section II, public water supplies, the following statement is made relative to CCE: "The defined method* of treatment generally removes very little of the CCE in the raw water. In many instances, there is an increase during treatment. Whether this is real or apparent is not known." The three systems with high CCE values all provide more than the "defined treatment."

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"...may include coagulation (less than about 50 ppm alum, ferric sulfate, or copperas with alkali addition as necessary but without coagulant aids or activated carbon), sedimentation (6 hours or less), rapid sand filtration (3 gal/sq/ft/min or less), and disinfection with chlorine (without consideration to concentration or form of chlorine residual)."

* See Chapter VI, Section F3

Eight filters were installed at carefully selected locations on the New York City system. While no values exceeded 200 ppb, it is interesting to note that, in the 88 miles of Delaware Tunnel, there was an increase of 52 ppb; and in the 92 miles of Catskill Tunnel, the increase was 120 ppb. Since there had been no repairs to either tunnels and both are under high pressure, one can only assume that growths are occurring which fall off and are picked up on the filters.

Water from these two tunnels dropped 71 ppb after passing through the Kensico Reservoir. This phenomena also occurred on the Croton System as the water passed from the Croton Reservoir through Jerome and then Central Park Reservoirs. The results were 147, 117, and 82, for a total drop of 65 ppm.

Personnel in charge of the systems discussed in this section indicated an interest in participating in further work with the Public Health Service on the carbon adsorption technique.

## VI. K. WATER QUALITY EVALUATION

The following analysis is based on distribution system samples and finished water samples only. Raw water samples taken prior to treatment are not included. Basis for summary are Tables 3-R, 3-W, 3-NYC, 3-N, and 3-S, in Appendix B.

### Mandatory Standards

The Community Water Supply Study for the New York Standard Metropolitan Statistical Area included ten constituents for which the Public Health Service Drinking Water Standards list mandatory limits. Only four of these, coliform, lead, cadmium, and fluoride had samples with values exceeding the standard. A breakdown is shown in the following table.

| | Coliform | Lead | Cadmium | Fluoride |
|---|---|---|---|---|
| Total number of samples | 902 | 965 | 965 | 965 |
| Number of samples exceed standard | 12 | 9 | 1 | 1 |
| Percent exceeding standard | 1.3 | 0.9 | 0.1 | 0.1 |

For the remaining six mandatory constituents, arsenic, boron, chromium, cyanide, gross beta activity, and silver, there were no samples with values exceeding the standards.

## Recommended Standards

Seventeen constituents, for which the Public Health Service Drinking Water Standards list recommended limits were tested during the study. In the New York State Metropolitan Statistical Area ten of these had values exceeding the limits. A summary is presented in the following table:

| | Manganese | Iron | Zinc | Copper | Nitrates |
|---|---|---|---|---|---|
| Total number of samples | 965 | 965 | 965 | 965 | 257 |
| Number of samples exceeding standard | 88 | 108 | 3 | 14 | 4 |
| Percent Exceeding Standard | 9.1 | 10.3 | 0.3 | 1.5 | 1.6 |

| | Chlorides | Total Dissolved Solids | Turbidity | Color | CAM-CCE |
|---|---|---|---|---|---|
| Total number of samples | 257 | 257 | 257 | 257 | 35 |
| Number of samples exceeding standard | 2 | 6 | 7 | 5 | 5 |
| Percent Exceeding Standard | 0.8 | 2.3 | 2.5 | 1.9 | 14.3 |

For the remaining seven recommended constituents, alkyl benzene sulfonate, arsenic, boron, cyanide, radmium 226, strontium-90 and sulfate, there were no samples with values exceeding the standards.

Relative to manganese there were only nine samples with values exceeding the New York State standard. Thus those supplies with the remaining 79 samples, not exceeding the state standards, would not provide treatment to lower the amount of this constituent.

In Nassau and Suffolk Counties many spplies treat iron by sequestering. Although this prevents problems and eliminates complaints the iron is still present and is measured in the test for iron. Of the 108 samples listed, 39 were from supplies that were treating.

## VII. A. WATER RESOURCES DEVELOPMENT

### 1. Drinking Water Quantity

The New York State Health Department's Comprehensive Utilities Planning Sections has a grant program which provides funds for Comprehensive Public Water Supply Studies. For the New York SMSA such studies have been completed. Examples are Northern Westchester CPWS-10, Suffolk County CPWS-24, and a combined report for New York City and Westchester County CPWS-27. For Rockland County, CPWS-67 has just been completed and is being reviewed. A grant was recently awarded for the preparation of a similar report, CPWS-60, for Nassau County. These two- and three- hundred page reports cover all phases of water systems, including potential sources outside the service areas. Appendix D.a contains a sample of one such proposed project from CPWS-27.

The New York SMSA is a major portion of the core area of the Corps of Engineers, Northeast Water Study. This study covers portions of New York, New Jersey, and Connecticut, with potential sources as far away as the Susquehanna River, the Connecticut River, the St. Lawrence River, and Lake Ontario. Maps illustrating these three distance sources are shown in Appendix D.b.

The following three paragraphs from a synopsis of a preliminary draft briefly outline the work of this study:

"More than 100 separate water supply projects drawing on surface water resources between the Susquehanna and Connecticut rivers and the groundwater resources of southern New Jersey and Long Island have been investigated. The investigation differed from conventional water supply projects studies in that instructions from the North Atlantic Division, Corps of Engineers, stressed engineering feasibility of the projects and stated specifically that 'any jurisdictional authority, boundary limit, or details of project financing shall not limit or influence a selection.' Without this stipulation, many of the projects described might not have been investigated. In estimating the yield available and in sizing projects, however, downstream water requirements and minimum flows needed to maintain satisfactory water quality were taken into account.

"The canvass of water resources within reasonable distance of the study area indicated that water needs through 2020 could be met economically without seeking far-distant sources of supply and reclamation of wastewater until the costs of such processes had dropped substantially below present estimates.

"By combining projects convenient to the several parts of the study area and varying their order of development, any number of feasible water supply programs could be derived. To illustrate the range of potential developments and the cost of water, typical favorable projects were consolidated in six illustrative regional programs, each of which would provide the study area water needs in 1980, 2000, and 2020. While the programs differ as to the sources of water and their order of development, all programs ultimately would make use of the Delaware, Hudson, Housatonic, and Connecticut Rivers."

The additional sources were sought on the basis of the following estimated deficiencies:

| | Gallons per day | | |
|---|---|---|---|
| | 1980 | 2000 | 2020 |
| New York | 160,000,000 | 450,000,000 | 820,000,000 |
| New Jersey | 150,000,000 | 450,000,000 | 840,000,000 |
| Connecticut | 40,000,000 | 100,000,000 | 240,000,000 |
| TOTAL | 350,000,000 | 1,000,000,000 | 1,900,000,000 |

It should be noted that, of a total estimated 1980 population of 21,511,000 for the study area, 12,511,000 are estimated to be in the New York SMSA. The remaining 8,535,000 people are in the portions of New Jersey, Connecticut, and New York forming the study area.

The great need for additional water sources in the SMSA may be seen from Table II. The estimated population growth for the nine counties for the next 50 years is 4.56 million, with a predicted increase in water demand of 1,270 MGD.

## VII. A. 2. DRINKING WATER QUALITY

Most water resources studies, when looking at water quality, have a tendency to consider dissolved oxygen and BOD only. The Corps of Engineers Northeast Water Supply Study, while listing 26 items relative to water quality, includes only three of nine mandatory and three of the 15 recommended standards listed in the 1962 Public Health Service Drinking Water Standards. No consideration has been given to the presence of pesticides, insecticides, or other exotic chemicals.

The NEWS study presents water quality data on 18 surface and ground water sources considered in the study; however, only seven present yearly minimum, maximum, and mean values; the rest are the results of one-to three-day single samples, even though additional data is available.

On the basis of the foregoing, it is hard to understand how the statement "all of the waters considered for development in this report are amenable to treatment by conventional methods" can be justified.

Since the NEWS study has covered water quality in greater detail than most water resources studies reviewed by Region II, the need for insuring that the health aspects of water quality are considered in proper detail relative to drinking water and recreation is quite obvious. The possibility of the development of water system sources at great cost to the public which, due to poor water quality, cannot meet drinking water standards emphasizes the responsible role the Public Health Service and other health agencies must assume.

The foregoing deficiencies in the NEWS Study have been called to the attention of the Corps of Engineers by the Public Health Service staff. Although reviewing water resources and other projects relative to drinking water and health aspects is the responsibility of the Public Health Service, it is one that has not been adequately carried out. In some ways, it might be attributed to staff shortages; however, the main fault lies with the lack of planning for sufficient staff and funds. In the regions, if it were not for the Corps of Engineers and other reimbursable funds, the Service would have found it extremely difficult to carry out even a small part of the effort needed.

Most of the supplies in the New York Standard Metropolitan Statistical Area have been in the typical fortunate Northeast situation, good upland supplies or ground water. However, only a few short years ago, water shortages saw New York City a second time hurriedly setting up facilities for using the Hudson River. Some of the plans found in the studies mentioned in the previous section on Quantity list the Hudson River as a main source of the area for the future.

On a quality basis the Hudson River appears to be better than average for comparable rivers throughout the country. In the areas being considered as possible locations for an intake, the water quality generally meets most of the Public Health Service Drinking Water Standards.* Several conventional water treatment plants presently in operation in the area remove color, turbidity, and bacteria to meet the standards. The recently expanded water pollution control program is actively working to improve the water quality of the river. However, about 150 miles upstream from New York City, there are starting to appear from industry, refractory organic constituents. It is quite doubtful if conventional treatment processes, water or sewage, will be effective in removing such wastes. A similar situation is occurring on many rivers throughout the country.

The New York State Stream classifications say very little about these wastes. Other than the typical items listed 40 years ago, there is one short section on Toxic Wastes and Deleterious Substances, which reads as follows:

> "None alone or in combination with other substances or wastes in sufficient amounts or at such temperatures as to be injurious to fish life makes the waters unsafe or unsuitable as a source of water supply for drinking, culinary or food processing purposes, or impairs the waters for any other best usage as determined for the specific waters which are assigned to this class."

* See tables in appendix B.3, pages A55 and A56

Other than the carbon adsorption technique there are no tests or treatments for these new chemical wastes. In addition, little is known of the toxic or carcinogenic effect of these wastes alone or combined on the human body.

Presently the possibility of spills of oil and other hazardous material on the Hudson River poses a greater problem to water supplies using the river as their source. A contingency plan with a warning system has proven fairly successful to date.

In addition the New York State Department of Health, Division of Laboratories and Research, found virus in the same upstream areas of the Hudson River*. The use of such sources clearly indicates the need for more knowledge relative to the transmission, survival and removal of virus from drinking water sources.

Two other problems of concern to health officials are the suburban buildup on watersheds in areas too remote for municipal sewage treatment facilities and the increase in number of individual disposal systems where ground water is the main source of supply. In the New York SMSA, the Croton Watershed in Westchester and the eastern area of Long Island are typical examples. Also of concern to some officials is the disposal of industrial waste and the possible leaching of substances from solid waste sanitary landfills.

Area water supply personnel are cognizant of these problems and are trying to take appropriate action. For example studies for New York City include possible treatment facilities for not only a future Hudson River source, but also the Delaware, Catskill, and Croton supplies. On Long Island, attention has been and is being concentrated on the nitrate problem.

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* Annual Report of the Division of Laboratories and Research for 1962

In view of the foregoing it should be obvious that there is a need for public health engineers not only to review projects involving drinking water but to provide critical data. There is a tremendous need for joint research by the doctors, chemists, engineers, et cetera, relative to the toxicity and carcinogenic effects of wastes on humans. Limits should result from such studies to be followed by research to determine the methods of removal.

One wonders about the relative importance of humans when he reviews the Report of the National Technical Advisory Committee to the Secretary of the Interior on Water Quality Criteria, April 1, 1968. In Section II, Public Water Supplies, we find eight pages and 10 references cited, while in Section III Fish, Other Aquatic Life and Wildlife, we find 71 pages and 243 references.

## VII. B. WATERBORNE DISEASES AND OTHER ASSOCIATED WATERBORNE HEALTH PROBLEMS

Present practice and constant surveillance have reduced the incidence of disease that can be directly attributed to water supply to almost zero. While there are many outbreaks of diseases which may be waterborne, trying to pinpoint the cause as a public water supply is quite difficult; since there may be many other possible sources. Generally health officials and the utilities act as if the source were the water supply and take all necessary steps and precautions possible.

The maintaining of chlorine residual throughout a distribution system is probably the main factor in controlling waterborne diseases. However, chlorine does not provide protection against such substances as chromates, phosphates, phenols, lead, and all the new synthetic organic chemicals. As has been indicated in other sections of this report, the health implications of these items is not fully known, however, they may have an effect on human health. That they do get into public water supplies, either through cross-connections or from the source (and in general the best treatment plant cannot remove them) is evident from many of the presented cases.

The following cases were obtained from municipal, county, or state health department officials.

Rockland

Case I - An infant had intestinal disorder due to shigilla. Sampling indicated source as private well serving home of infant. County Health Department after survey, sampling and testing, recommended that the poor do it yourself job by the infant's father on the well area, pumping, and housing be corrected by a professional well man. There were no further outbreaks after the recommendations were carried out.

Case II - Individual private wells serving about 30 people in seven houses in a one block area were suspected of being the cause of 12 cases of infectious hepatitis. While the county health officials were not able to definitely prove the private wells as the source of the outbreak, it recommended that the area be served by a public water supply. After the installation of service by the Spring Valley Water Company, there were no more cases in the area.

This might be considered a typical case, where an area wishes to maintain its own private wells because of the cost or the "horrible chlorinous taste" that generally is associated with a public supply. It is too bad that it requires sickness and force by health officials to overcome such resistance, when a safe public supply is so readily available.

Westchester

Case I - The Village of Croton-on-Hudson obtains its entire water supply from two deep and three shallow wells. In 1963, the drive shaft on one of the deep wells broke; this was followed on the next day by a break in the drive shaft on the second deep well pump. These two wells provided 50% of the water for the system. Under the supervision of a County Health Department, engineer emergency pumps and chlorinators were placed on temporary supplies. Prompt action prevented the distributing reservoir from dropping enough to create low pressures in the system and health problems from possible back siphonage. Constant chemical and bacteriological surveillance was maintained by the health department until the shafts had been repaired. No sickness was reported during the mishap.

Case II - Several years prior to Case I, the Village of Croton-on-Hudson experienced a complete flooding of all their sources. The Village, under the supervision of the County Health Department, arranged for the use of emergency sources, pumps, chlorinators, piping and other equipment. The Department also supervised the operation and maintained constant chemical and bacteriological surveillance until the entire facility was restored. During the emergency, use of the interstate carrier watering points for the New York Central

Railroad was ordered discontinued. No outbreaks of illness were reported during the entire episode. Currently, all sources have been flood-proofed to prevent a recurrence and possible contamination.

Case III - During the Community Water Supply Study, one of the distribution system samples for the Tarrytown Water District had a high coliform count. The county health department investigated and found a few additional high counts in the same low service system and traced the source to an uncovered distribution reservoir. The water district was ordered to immediately remove the reservoir from service. It was then emptied, cleaned, and disinfected. Upon refilling the effluent was chlorinated.

The district had been informed previously that the county board of health recommended that all distribution reservoirs be covered. The county health department has advised the municipality that open distribution reservoirs are no longer permitted by the State Sanitary Code without post chlorination. The municipality is currently taking steps to comply. Constant surveillance is being maintained.

Case IV - A trunk sewer in Mamaroneck became blocked during the night. The waste flowed out of one manhole into one of the Westchester Joint Water Works reservoirs. The county ordered immediate discontinuation of use of the reservoir in spite of the fact that it was being treated by a plant with as high a degree of treatment as is available today. County health department sampling of the distribution system proved no penetration by the wastes. After a surveillance period, during which chemical and bacteriological tests were run on samples taken from the area of the spill, the reservoir was placed in use again and a chlorine residual of 0.5ppm maintained in the plant effluent for several days.

Case V - The main source of supply for Mt. Kisco, New York is Byram Lake. Between 1966 and 1969, the state highway department constructed Route 87 near the edge of the lake on the opposite shore from the Mt. Kisco intake. Prior to construction, there was considerable concern over the possibility of increased turbidity due to erosion of new highway embankments. A county health engineer recommended diversionary ditches and settling basins. Constant surveillance was maintained during the entire period. Although a slight increase in turbidity was observed in the lake during construction, in spite of the precautions, there was no noticeable increase in the finished water. Bacteriological surveillance was also maintained throughout the entire period.

New York City

Case I - In order to correct a taste and odor problem caused by algae, alum was added to the Croton aquaduct. This procedure produced a floc, which settled out the taste-and-odor-causing organisms in the Jerome Park Reservoir. Turnover due to wind action resulted in the alum entering the distribution system and reaching the consumer. This caused a serious taste problem along with a drying of the mouth. At a cost of $900,000, the one billion gallon reservoir was drained and cleaned. In addition, microstrainers were installed.

Case II - In September, 1969, in the north central area of Manhattan, which is served by the Croton Water Systems, the larva and pupae of chironomids and chaorbus were found. The chironmid is a midge fly, and the chaorbous is a non-biting mosquito. While both insects have no health significance, their presence is aesthetically undesirable. The source from which the insects were originating was discontinued until the organisms were eliminated. The great flexibility of the New York City system permitted the use of other sources with no inconvenience to the consumers.

Case III - In high rise buildings in New York City, booster pumps in the buildings are used to fill elevated storage tanks that service the upper floors. These pumps are installed so that they usually require a normal distribution system pressure of about 40 psi. A reduction in system pressure due to a large fire or main break may render these pumps inoperative. This results in a complete breakdown of the elevated tanks. When the pumps are returned to service, there is a tendency for the sediment in the bottom of the tanks to be stirred up and introduced to the system within the building. The resultant dirty water does have a potential health hazard. This problem could be almost entirely eliminated if the pumps were installed so as to operate off a distribution system pressure as low as 5-10 psi. Usually, because of the extensive looping system within the area of the high rise buildings, such a pressure can usually be supplied with little or no time delay.

Case IV - During the summer, the opening of hydrants by the public has become so extensive that combined with large fires and main breaks low pressure resulted in Brooklyn and lower Manhattan. In order to prevent the potential health hazards closely associated with low pressures, the city recently broke ground on Water Tunnel No. 3. It is estimated that it will require 20 years and over $1 billion to completed this project in five stages. This 24 foot aquaduct will carry water from the Kensico Reservoir to all five boroughs. As each stage is completed it will be placed in operation, thus permitting inspection and repairs to existing tunnels. The present tunnels or aquaducts and the new one, including the five stages, are shown on the following map.

Tunnel No. 3

15 miles in Westchester
50 miles in New York City

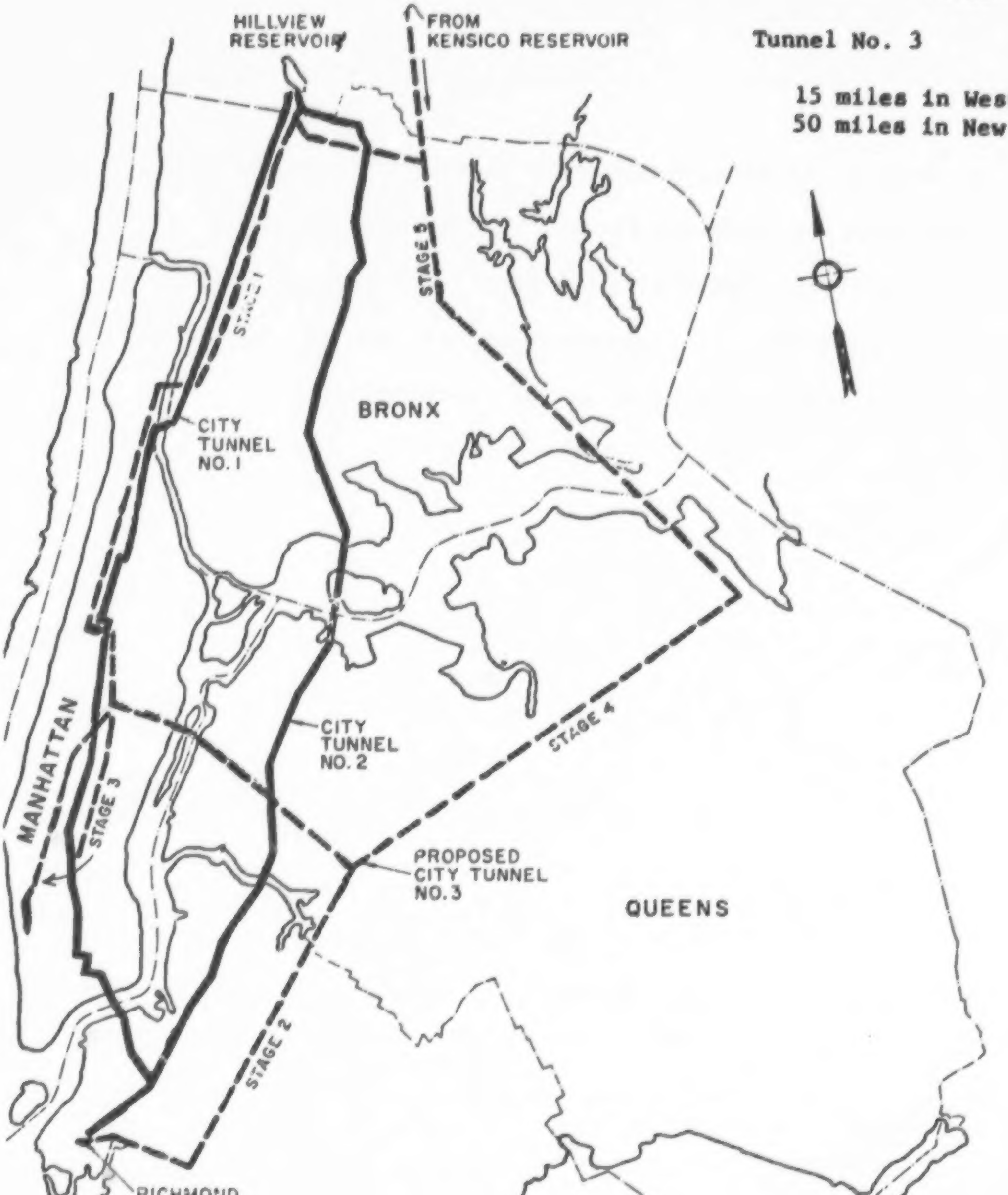
HILLVIEW RESERVOIR
FROM KENSICO RESERVOIR
STAGE 1
STAGE 5
BRONX
CITY TUNNEL NO. 1
MANHATTAN
STAGE 3
CITY TUNNEL NO. 2
STAGE 4
PROPOSED CITY TUNNEL NO. 3
QUEENS
STAGE 2
RICHMOND DOWNTAKE
BROOKLYN

FIGURE NO. 2

NEW YORK CITY TUNNEL FEEDERS

## Nassau

Case I - A vending machine dispensing drinks, in operation for about a year at a country club, was improperly connected to the recirculating hot-water system. Anti-rust solution containing sodium dichromate, trisodium phosphate, and sodium hydroxide was added to the heating system; this was dispensed in the drinks, causing acute gastroenteritis in 11 persons who purchased drinks from the machine. All recovered with no fatality.

Case II - A series of positive samples from one water district on one particular day were reported. Resamples of the community, all their wells, and storage tanks showed the contamination to be occurring from an elevated storage tank. Investigation of the tank showed that pidgeons were nesting inside the tank. They were immediately removed and their source of entrance was repaired. During the entire investigation, the water district had been following emergency chlorination procedures. After the trouble had been repaired, emergency chlorination stopped and no further positive bacteriological samples were encountered. Fortunately, no one received any adverse affects from this occurrence.

Case III - On information supplied by a local water district, it was found that on one specific block all of the service pipe was made of lead. Sampling of all the houses showed that one particular home was receiving lead over the standard. All of the residents were advised of this standard for lead and the possible toxicological problems that could occur with ingestion of excess quantities. The one home whose lead content was found to exceed the standard was advised to immediately change its service connection.

Case IV - An incident involving contamination of a public water supply by hexavalent chromium originated from a rust inhibitor added to a domestic heating system utilizing recirculating hot water. A heating oil dealer, as part of his service, added a rust inhibitor containing chromate to the recirculating systems of his clients. These domestic systems are typically connected to the public water supply for makeup. In the incident which occurred, low pressure was experienced in the street water mains because of heavy summer demand. At the same time, a drop in the pressure of the heating system in the home in question occurred and this resulted in the opening of the makeup valve. Since the heating system pressure was still greater than the water main pressure, chromate bearing water made its way into the potable water lines in the home with a strong probability that some of it had gotten into the mains. As a result of this incident, the oil company removed all chromate rust inhibitors from clients' systems. The oil industry on Long Island was also advised of the problem and cautioned about adding toxic inhibitors to heating systems without a suitable air break.

## Suffolk

Case I - In North Babylon, tests revealed chromates in excess of Public Health Service and New York State Standards in the water supply of a motel. The deepening and drilling of several new wells failed to eliminate the chromates. County field staff traced the source to an industrial area about 1,000 feet away. Because of the time element for removal of the contaminate from the ground water, public water supply was brought into the area. A permit system for all industrial discharges was also instituted to prevent further contamination.

Case II - In the Town of Babylon, a suit by residents whose wells had high chromates closed a plating plant that was discharging chromates in their wastes. Deepening the wells eliminated the problem; however, three years later resampling indicated that the same chromate wastes were reaching the deeper strata. In addition, many houses now had detergents in their wells. Action by the County Health Department resulted in public water and sewers to serve the area. The town now imposes greater restrictions on lot sizes and sub-surface disposal.

Case III - The Town of Riverhead received many complaints due to red and black water and hydrogen sulfide odors. A new treatment plant operator, who opposed fluoridation, attributed the cause to fluoridation. Investigation by the county health department staff pinpointed one well as the cause. It was introducing the iron bacteria crenothix into the system. Treatment eliminated the problem; however, in spite of seven previous years of successful fluoridation, it once again became an issue and the town decided to stop the addition of fluoride.

Case IV - Several years ago the County surveillance program for public water supplies revealed the presence of synthetic organics in wells in the glacial aquifer. The maximum depth of these wells is about 500 feet. As an immediate solution, the county required drilling beyond this depth into the magothy aquifer. On a long term basis, the county is pursuing an intensive program for public sewers. Currently about 93% of the county's 922 square miles depends on individual disposal systems.

Case V - The Long Island area was one of the first to face the detergent problem. In some cases, launderettes, which were contaminating private wells that could not be served by public water supplies, were forced to close. At present the county has litigation pending against 78 launderettes which have no treatment facilities.

## VII. C. NITRATE POLLUTION OF GROUND WATER

Probably the most critical problem facing water supplies in the New York Standard Metropolitan Statistical Area in the near future is the nitrate pollution of groundwater in certain areas of Long Island. On Long Island, groundwater is the only source of water supply for all of Nassau and Suffolk counties and for the two smaller supplies serving areas of the Borough of Queens in New York City.

Figure 3, a cross-section of Long Island through Nassau County is fairly typical. This abundant supply of good quality water is gradually showing the effects of man's intrusion. The synthetic detergent and nitrate problems are two quality problems that have received considerable attention. In Suffolk County, 93% of the area is served by individual disposal systems, which include industrial wastes. In Nassau County, 80 MGD of domestic sewage and 66 MGD of storm water, industrial wastes, etcetera, are discharged to the ground water.

The recently published Report on Nitrate Pollution of Ground Water by the Nassau County Department of Health revealed that 20 public water supply wells had nitrates above the standard. The county has compiled an extensive record relative to the quality of water from wells. On the basis of these data, a computer program was prepared that predicted 53 of the 333 wells would exceed the nitrate limit by the year 2020.

At present the only solutions have been a blending of water with high nitrates with that from other wells to provide a water within the limit or drilling the well deeper. Both procedures are recognized as temporary measures. In the meantime, every effort is being made to seek a solution. The excellent efforts put forth by the county health departments and many of the utilities should be given more support by the Public Health Service. The maintaining of nitrates below the limit is not only a local problem; but, as is evidenced by the papers recently presented at a recent Conference on Nitrates, it is a nationwide one.

Research is needed as to both limits and methods of removal of nitrates.

# GEOLOGIC SECTION – NASSAU COUNTY

| Aquifer | Permeability |
|---|---|
| GLACIAL | Moderate to High |
| MAGOTHY | Moderate |
| RARITAN | Very Low |
| LLOYD | Low to Moderate |

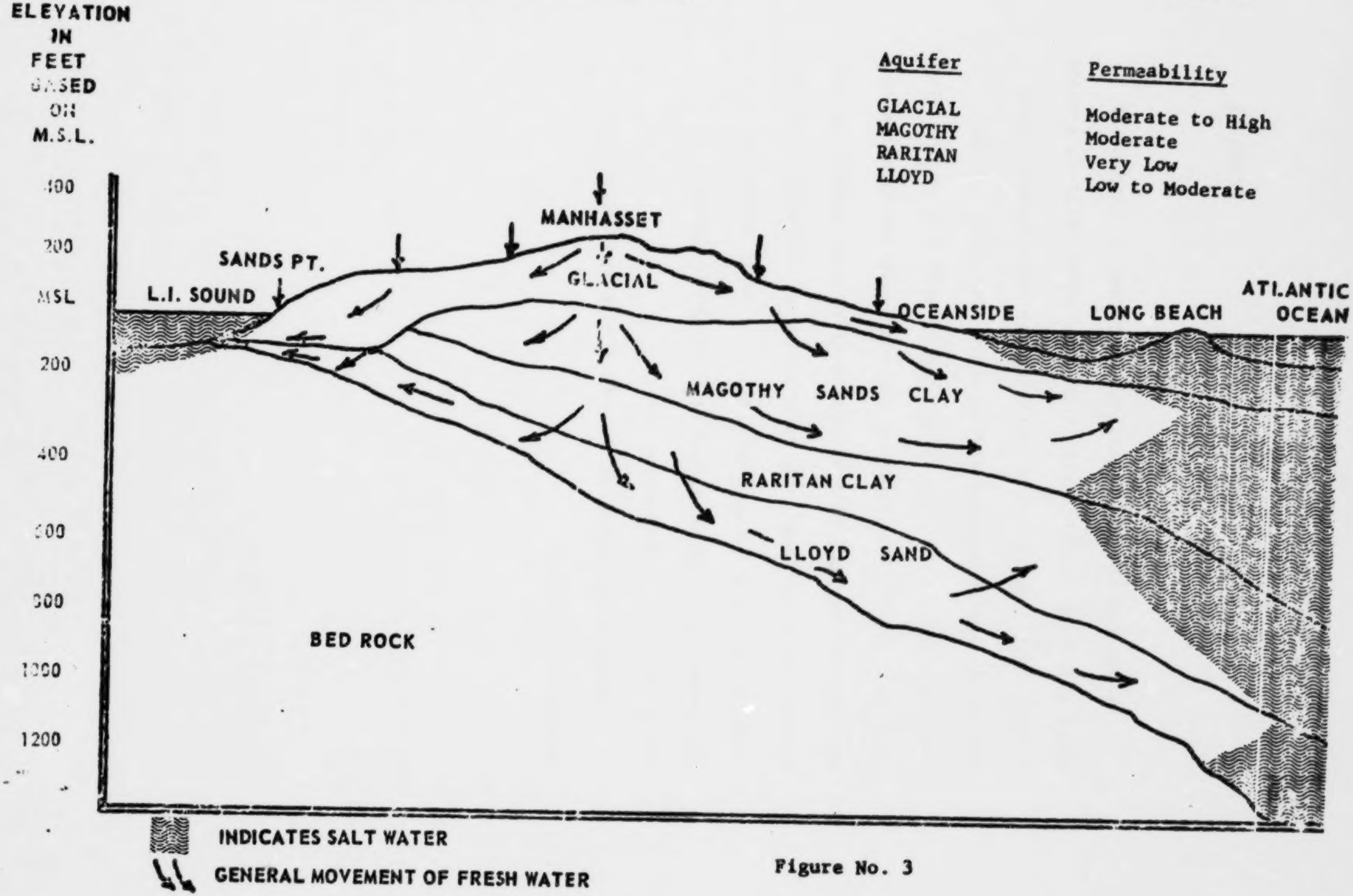
ELEVATION IN FEET BASED ON M.S.L.
400
200
MSL
200
400
600
800
1000
1200
L.I. SOUND
SANDS PT.
MANHASSET
GLACIAL
OCEANSIDE
LONG BEACH
ATLANTIC OCEAN
MAGOTHY SANDS CLAY
RARITAN CLAY
LLOYD SAND
BED ROCK
INDICATES SALT WATER
GENERAL MOVEMENT OF FRESH WATER

Figure No. 3

## VII. D. SALT WATER INTRUSION

All sources for water supply on Long Island are ground water. Nassau and Suffolk counties, and the two smaller New York City systems serving part of Queens are wholly dependent upon wells. The remaining services in Queens and all of Kings County are supplied by the upland surface systems of New York City. In New York Water Resources Commission Bulletin 62, an Atlas of Long Island's Water Resources, the existing ground water situation and possible solutions to anticipated problems are very well presented.

Figure 3 shows a geologic section of Long Island at its widest point, about 20 miles. This is a fairly typical cross-section; and, as the key indicates, the permeability of the aquifers makes them ideal storage areas.

As set forth in Bulletin 62, salt water intrusion appears to be a problem in the southeast area of Queens County. This was also evident from the chloride content of some of the samples taken from wells in the area during the Community Water Supply Study.

In the past, efforts to maintain the ground water level, conserve water, and restrain salt water intrusion have depended on two procedures.

One of these was the use of diffusion wells, also called artificial recharge or injection wells. There are over 1,000 of these wells scattered over the entire island. However, the majority are located in the more populous western end. The

New York State Water Resources Commission regulates and controls this policy, which requires that only uncontaminated water be returned. In 1965, it was estimated that the recharge by this procedure was 45 mgd.

The second procedure is the use of recharge basins or sumps. Currently there are over 2,000 of these basins, which vary in depth from 10 to 20 feet and in area from 1 to 30 acres. The majority are located in Nassau, with the increase now mainly in Suffolk. The policy has been to use these to provide a substitute for natural infiltration where extensive paving is done. Design is such that the water infiltrates within a day or so.

At the end of Bulletin 62, six alternate methods for preventing salt water intrusion are presented.

## VII. E. PESTICIDES, INSECTICIDES, AND HERBICIDES

The water systems in the New York Standard Metropolitan Statistical Area are presently faced with several problems relative to the use of pesticides, insecticides, and herbicides.

This includes their use by homeowners on lawns and around the foundation of their homes to control termites, by the farmers for agricultural control, and by utilities, highway departments, and local governments for controlling growth along right of ways.

### LAWN AND TERMITE CONTROL

The use of pesticides and insecticides on lawns and for termite control has been a concern of health department staff in Nassau and Suffolk counties.

During the CWSS in Nassau County, samples were taken on seven wells while in Suffolk 11 well samples were collected. Presence of substances was detected in only three of the 18 wells and these were all within the limits.

While the public water supply wells appear to be all right, both counties are concerned over the use of substances relative to private wells. The proposed increase in staff for Nassau County will permit further investigation; however, there is concern over the lack of laboratory equipment for performing the tests. Assistance by the state or Public Health Service should be made available.

For termite control, all the substances tested during the CWSS have been and are being used. They are the so called hard pesticides, such as chloradane, dieldrin, endrin, aldrin, toxaphene, heptachor, lindane, and DDT, which remain in the soil from six months to as much as seven years. In providing protection for a house, the exterminator jets a solution about eight feet into the ground all around the foundation and in the basement floor. The number of half inch holes and amount of substance depends upon the size, shape, and other characteristics of the house. In the past chloradane was most widely used; however, dieldrin now seems to be more effective and to last longer.

In Suffolk County, one town has passed an ordinance prohibiting the use of all hard substances. It now appears that other towns will follow this procedure.

The soft substances breakdown faster thus requiring more frequent reapplications than the hard. At present the only soft substance being used is diazone.

It is quite apparent that further study is necessary to determine which procedure should be used, hard agents with less frequent application or soft with more frequent applications, to insure that the potential hazard to public and private wells is eliminated.

## SPECIAL INVESTIGATION OF A PRIVATE WELL

During the Community Water Supply Study, the Suffolk County Department of Health staff investigated a private well supplying a house that had recently been treated for termites. A solution was used containing approximately 10,000 ppm of chlordane. It had been injected into the ground around the foundation and through the cellar floor. It was also sprayed on the wood just above the foundation. Based upon a noticeable change in the taste of the water, the county requested that the Public Health Service run the series of pesticide tests that were being done for the CWSS.

Of the ten pesticides tested, three were found in trace amounts similar to that found for public supplies, dieldrin $<0.1$, heptachlor 0.2, and heptachlor-epoxide $<0.1$. However, 12.9 ppb of chlordane were found. This is over four times the limit of 3 ppb.

Although there was an old uncapped well nearby which might have been partially responsible, the fact that the well was only three feet from the house foundation would seem to indicate a problem regardless of the old well.

Many of the older houses in the county have their wells close to the house foundation or in the basement. In view of the discussion on termite control procedures, it is hard to imagine such wells as not becoming contaminated.

Presently the county sanitary codes require only a three foot space between the house foundation and its well.

The owner of the contaminated private well, at the request of the county staff, pumped his well fairly constantly over a five-six week period. A second sample was taken and also forwarded to the Public Health Service water supply laboratory. The tests on this sample showed 1.5 ppb of chlordane with none of the other substances being detected.

The foregoing discussions, although based on a private well case, clearly indicate needs in several areas. A complete investigation should be made as to the entrance of pesticides into ground water, their persistance, and their rate and distance of travel. Such information is needed to insure the future protection of public water supply ground water sources.

Suffolk County should also consider revising its sanitary code and making provisions for the testing of pesticides by the county laboratory.

## AGRICULTURAL CONTROL

In Suffolk County, 37,718 acres of the four main crops -- namely, potatoes, cauliflower, cabbage and corn -- were planted in 1968. The general trend relative to agriculture has been downward. The present potatoe acreage of 34,200 is down from a high of 42,699; cauliflower 1,648, down from 5,200; cabbage 1,050, down from 2,400; and corn 820, down from 1,600. On the other hand, nursery and sod farms are increasing. In 1968, there were 105 nurseries using 3,609 acres, and 11 sod farms covering 3,292 acres.

These trends are obvious when one considers the population growth actual and predicted for Suffolk County:

| | | |
|---|---|---|
| 1960 | 666,784 | Census |
| 1969 | 1,200,000 | Estimated |
| 2020 | 2,022,000 | Predicted. |

In the past, all the substances tested for during the CWSS were used on crops in Suffolk County; however, over the past five years they have gradually been replaced with new ones. These are too numerous to enumerate here; however, as an example 1970 Potatoe Crop Control Recommendations for New York State are listed below.

Seed Treatment
- Captan
- Polyram
- Dithane

Weed Control
- Per Merge
- linuron ,
- Patoran
- Eptam
- amitrole

Insect Control
- parathion
- endosulfan (Thiodan)
- carbaryl (Sevin)

- dalapon
- Guthion
- Meta-systox
- malathion
- demeton
- dimethoate

Blight Control
- maneb
- Dithane
- Manzate
- polyram
- Daconil
- Difolatan
- nabam
- duter

Additional chemical suggested for other purposes include:
- Vapam
- maleic hydrazide
- Chloro-IPC
- Fusarex.

Expanding the foregoing on a countywide basis, the necessity for constant research relative to the possibility of such chemicals getting into water supplies, surface and ground, is obvious. Such questions as does the chemical persist in being carried through the soil to the wells or over the ground to the reservoir, how far away from drinking water source should the chemical be applied, and most important is the chemical a health hazard when consumed by man through water must be answered.

Another important consideration that the Suffolk County health department personnel must consider is the use of irrigation wells as water supply sources as farms disappear and suburbia takes over. The water supply staff would like to check out all wells thoroughly prior to any such use; however, present staff is insufficient and laboratory facilities are not available for testing pesticides or insecticides. Consideration might be given for the Public Health Service to provide the laboratory work.

## APPLICATION ON WATERSHEDS

The Region II office of the Bureau of Water Hygiene is constantly receiving requests for information on the use of pesticides, insecticides, herbicides, etcetera, relative to reservoirs and watershed.

New York State has laws governing the application of chemicals to reservoirs, but not to land areas. While many requests are on the use of new chemicals in reservoirs, most pertain to their use on watersheds. Some of the questions are:

1. Can the chemical be applied on the watershed?
2. If yes, how far from the reservoir or tributary should the application be made?
3. How much can be applied?
4. What strength should be permitted?
5. Time interval for reapplication?
6. Can it be applied with other chemicals?

New York City has spent millions installing sewage treatment facilities for populated areas on its 1967 square miles of watershed to control pollution, yet it finds it can do little relative to pesticide pollution. Currently it is exercising all the control possible by requiring highway departments, railroads, agriculture, institutions, utilities, etcetera, to obtain permits prior to the use of any chemicals on their land or right of ways from which water can drain into the city's reservoirs.

In the submission of permits, the Department of Water Resources asked that the following information be included, if possible:

1. Chemical(s) to be used
2. Exact area to be covered

3. All information available relative to chemical such as its common name, trade name and formula
4. Chemical's known toxity to any forms of life, especially human.
5. Rate of application
6. Time periods between applications
7. Tons per application and amount per acre
8. Purpose of application.

For the items not answered the department has turned to various local universities and the Public Health Service.

The Department of Water Resources made available a table listing 28 applications during 1969, for which permits were granted involving the use of chemicals on their watersheds. These requests were from state and county departments, power companies, railroads, authorities, and private developments. Data listed included treatment area, control purpose, nature of chemical, trade name, manufacturer, proposed formulation, rate of application, total quantity, and application period.

Chemicals listed were:

| | |
|---|---|
| Weedone | 2,4,5-T |
| Esteron Brush Killer 10S | 2,4-D |
| Esteron 2450.S. | |
| Aquathol Plus | |
| Radapon | Dalapon 2,2 dichloro propionic acid |
| Tordon | 4-amino-3,4,5-trichloro picolinic Acid |
| Simazine 80W | 2-chloro-4,6,bisstriazine |
| Bromacil | 5-Bromo-3-Sec Butyl Methyl Uracil |

| | |
|---|---|
| Hyvar X | Dichloro-phenoxy Acetic acid |
| Amino-Triazole | 3-Amino 1,2,4-Triazole |
| Sevin | Napthyl N-Methyl Carbamate |

The amounts applied varied from 75 to 1350 gallons and 120 to 2220 pounds. Rates of application varied from 1/2 to 100 gal/acre and 5 to 20 lbs/acre. Some applications have been turned down.

## VII. F. RESEARCH

New York State and the counties in the SMSA probably sponsor more research than other states or counties of comparable size. However, there are many water supply problems facing this area, which are also common to a large part of the county, that require funds and staff beyond their limits. These are the problems that are the responsibility of the Public Health Service.

### 1. Revisions to Drinking Water Standards

With the exception of manganese and the bacteriological sampling curve, New York State has adopted the Public Health Service Standards. However, when the PHS recommends a maximum content of 0.05 ppm for manganese, while New York State sets it at 0.3 ppm and the AWWA's goal is less than 0.01 ppm, it is quite apparent that a thorough investigation is needed. A more detailed back up explanation would help to resolve many disagreements, such as exist in the number of bacteriological samples to be taken monthly. This is very important in view of the workload already imposed on qualified laboratories. The discrepancy between New York State Minimum Number of Samples per month curve and the Public Health Service curves has already been mentioned.

Consideration should also be given to the separation of standards set for health reasons and those set for other reasons, such as staining or soap consumption. When the news media uses PHS released data, generally a bad water tag is attached to all supplies not given a top rating. Little thought is given to whether the basis for the rating was on mandatory or recommended items, or purely on administrative items, which involve a potential risk and have nothing to do with water quality.

The PHS in cooperation with the AWWA, the States, and all organizations with a common interest in safe drinking water should be continuously investigating existing limits and developing new limits. This should be done for the many new chemicals and other substances, with possible health implications that are now finding their way into sources.

In developing standards for drinking water, it is necessary to take into consideration the sensitivity of the test for a substance. Where evidence has indicated that human tolerance is extremely low the limit might be the lowest sensitivity of the test for a substance. However, in cases where this is not true and there are other sources of human exposure, it might be well if all sources are considered and standards are set for each in a proportional amount that does not exceed human tolerance.

### 2. Standards for New Substances

Each year hundreds of new chemicals are used in various manufacturing processes. As discussed in previous sections, agencies and firms working on water resources development have in the past given very little consideration to water quality other than the parameters that have been in use for many years. Our present treatment methods are incapable of removing many of these new exotic substances, some of which may be toxic or carcinogenic.

One also wonders what happens when water containing numerous such substances is consumed. The development of staff and facilities for investigating and developing limits for such substances is long past due. There should be included with the Drinking Water Standards a section on Raw Water Standards with the proper minimum treatment necessary to remove any substances with possible effects on health.

### 3. Advanced or New Treatment Methods

The need for new and advanced treatment methods has already been mentioned in previous chapters. In the Report of the National Technical Advisory Committee to the Secretary of the Interior, April 1, 1968, entitled Water Quality Criteria, Table 11-1 indicates that treatment consisting of coagulation, sedimentation, rapid sand filtration and chlorination has little effect on the following constituents:

Inorganic Chemicals
- Arsenic
- Barium
- Boron
- Cadmium
- Chloride
- Chromium
- Copper
- Hardness
- Lead
- Nitrates
- Selenium
- Sulfate
- Zinc

Organic Chemicals
- Carbon Chloroform Extract
- Cyanide
- Aldrin
- Chlordane
- DDT
- Dieldrin
- Endrin
- Heptachlor epoxide
- Methoxychlor
- Toxaphene
- 2-4-D
- 2,4-5-T
- Phenols

Radioactivity
- Gross beta
- Radium-226
- Strontium-90

The fact that today's conventional treatment has little affect on the listed constituents makes it imperative that new methods be developed that will not only take care of these, but all the new synthetic organics, pesticides, insecticides, and herbicides being developed each year. While the Community Water Supply Study did not reveal these items as critical at this time, it is doubtful if any health official in the area is not concerned about the future.

## VII. G. TECHNICAL ASSISTANCE AND PUBLICATIONS BY PUBLIC HEALTH SERVICE

In the past, it has been the policy of the Public Health Service to assist state and local agencies when the latter's staff, facilities, or funds were insufficient to undertake investigations of pressing problems. As described earlier in this report, there are many pressing problems in the New York SMSA; i.e., salt water intrusion, nitrate increase in ground water, cross-connection programs, et cetera.

While the local agencies will no doubt continue to work on solutions to these problems, assistance and coordination of effort by the Public Health Service should be available.

## Publications

Over the past years, the Public Health Service's Water Supply Program has been responsible for many excellent publications. In Region II, there have been many requests for these publications. State training courses are always seeking copies of such pamphlets as the Drinking Water Standards and the Water Supply and Plumbing Cross-Connections.

When the new manual for Evaluating Public Drinking Water Supplies came out, many requests were not filled because of the inadequate supply. Eventually, this fact became known and requests stopped.

Not only should there be a completely adequate supply of all publications, but there is a dire need for many new publications in the water supply field. When information on water supply is sought, most inquirers turn first to the Public Health Service. This responsibility has been created over the past years, and confidence should be maintained by the Service being able to provide information when requested, either from its own publications or by providing information on where it can be obtained.

This latter problem could be easily handled by a water supply information and retrieval system similar to that provided by the Solid Waste Program. Such a system would more than pay for itself in the time saved by the regional office staff in seeking information from different sources in order to fill requests. Many times such efforts are unsuccessful.

It is strongly recommended that adequate funds and staff be provided to maintain a publications inventory, develop an information and retrieval system, update existing publications and produce new ones.

## VII. H. PUBLIC EDUCATION

In general, until recent years, a major protion of the public could not understand why they should be charged for water. After all, it was a free source resupplied by nature, so why should delivery cost so much. Today, water pollution and drought have made the public more cognizant of the value of good water. However, many are not aware of the cost involved with supplying it and keeping it safe.

The public should be made aware of the great increase in cost of treatment as poorer sources have to be used, or upland supplies developed with tremendous cost of long transmission lines. The public should also be made aware of the high costs of installing a distribution system.

Even a good supply requires treatment. Few people would care for delivery of water without any treatment. All of the foregoing cost money. Costs will increase greatly as poorer sources have to be used, and as the distribution systems expand into suburban areas, especially where pumping and storage are required.

The Public Health Service and the State Health Departments should develop publications and other material that will inform the public of these facts. In view of the fact that most customer complaints were water costs, something is needed to assist the purveyor in meeting future increases.

Since in general today the public is more aware of the pollution of its environment than it has ever been before, every effort should be made to point out that many of these pollutants affect its drinking water. The possible costs necessary to continue present practices and the development of new methods that will keep water as safe and palatible as it is at present will more than justify the cost of a public education program.

Another complaint item that occurs quite frequently is chlorinous taste. A publication explaining the purpose of chlorination might help. The storage of drinking water in a refrigerator for a period to permit release of the chlorine and any other method should be included. Where the source has many industrial wastes, chlorine might be erroneously condemned or justly so when it combines with other chemicals.

The protection to health afforded by chlorination should be carefully presented so all will have a clear understanding.

## VII. I. CONSOLIDATION OF PUBLIC WATER SUPPLIES

The consolidation of water supplies or the absorption of smaller supplies by larger supplies has been encouraged and sought by all the states in Region II. There are many reasons for health officials advocating this monopolistic trend.

Generally the larger supplies, because of their financial status, are able to obtain better sources, or provide better treatment for poorer sources. In addition, the larger supplies are able to provide better staffing for their laboratories and sanitary surveys. They should be better able to do the required sampling for chemical and bacteriological protection. The data on sampling verifies this. Better service and ability to expand is usually possible because of financial status.

Relative to consolidation in the New York SMSA, there appear to be two trends. In New York City, the Department of Water Resources serves 8,000,000 people, while two smaller supplies serve 600,000 and 125,000 each. In Rockland and Suffolk counties, approximately 70 and 75 per cent of the people are served by one purveyor. However, in Rockland County, there are 29 supplies serving less than 1,000; and in Suffolk, there are 33 supplies in this category. The trend in these two counties is similar to that in New York City -- one big supply.

On the other hand, in Westchester* and Nassau counties, the consolidation appears to be more towards supplies serving 1,000 to 50,000. Westchester has 31 supplies in this range and Nassau had 32. Both counties have five supplies in the 50,000-500,000 grouping.

*In Westchester County the county health departments encourages the development of community water supplies in lieu of individual drilled wells in order to provide a better supply, and one which may later be consolidated into a regional supply.

Table 1 summarizes this information.

For county health officials, larger supplies in general make surveillance easier. However, in spite of the emphasis on consolidation, the present trend towards suburban living taxes even the ability of the larger supplies to service new areas. As a consequenee, new supplies spring up almost as fast as others are absorbed.

Additional factors hindering consolidation are increasing costs, and competition with air, land, and water pollution programs for funds and engineering services. In Suffolk and Rockland counties, geography is a very important factor. In some cases, companies, authorities, and municipalities are limited by their charters or other restrictions.

The following section provides additional information relative to Suffolk County.

Due to its geography, Suffolk County has the problem of over 90 public water systems, of which only seven serve more than 10,000 people. One system, the Suffolk County Water Authority, serves over half the population of the county. While the authority is taking over the smaller systems at the rate of five or six per year, the tremendous population increase has more or less maintained the 90 supply figure.

Due to limitations imposed by enabling state legislation and responsibilities to bondholders plus the fact that the authority operates on revenue bonds only and has no taxing powers, the problems associated with absorbing smaller systems are quite apparent. Despite these problems, the health department is continuously seeking the elimination of the small systems. This policy is being pursued because of the potential health hazards associated with low pressures, poor quality water, inadequate distribution systems, lack of standby equipment, adequate equipment, etcetera, which are generally characteristic of small systems.

Through hearings the authority has been required to take over many small systems. Consideration has been given to replacing the authority with a county department. It is felt that such a step would permit the elimination of many of the factors controlling the rate at which smaller systems can be taken over.

## VII. J. PUBLIC HEALTH SERVICE INTERSTATE CARRIER WATER SUPPLY PROGRAM

The ICWS program for rating water supplies serving interstate travel by air, land, or water in Region II has completely failed to maintain even the minimum required schedule. A complete survey and report should be done every three years. In Region II, only 17 surveys and reports out of a total of 108 interstate carier supplies have been completed. The regional office staff has also had difficulty in maintaining the annual reporting of ICWS on Form 682. This token program has caused considerable consternation for state and local officials responsible for the water supplies.

There are many reasons for the present situation. First, relative to the regional office staff, in all fairness, the blame cannot be attributed to their efforts. Many schedules have been prepared with the states and in some cases initial surveys made; but requests from headquarters, demands of other phases of the water program, plus the time consuming disaster work have made it impossible to do the job that should be done.

The State of New York considers the use of Form 682 as having considerable merit. The new state form 255 is patterned after form 682 and is now to be submitted annually to Albany for the 1,700 public water supplies throughout the state.

The purpose behind the ICWS program is excellent, but there is a definite need for drastic changes in the program. Time after time inquiries seek to know "where the supplies are with bad water?" Such inquiries arise from a news medium - radio, television, or newspaper - which has not completely understood or misinterpreted the ICWS released ratings. In seeking news worthy items, the media often twists information or takes it out of context.

The rating system of approved, provisional and prohibited does not distinguish between whether the rating was on an administrative or drinking water quality basis, whether it was based on samples with values exceeding the recommended or mandatory standards, or whether the values exceeding the standards were from the source or from the distribution system. All of these factors should be considered.

When the news media state that the water from a supply given a Provisional rating is unfit to drink, they might be doing a grave injustice to those who work so hard to provide safe drinking water to the public. This would be true when the rating was based on the operators license being one grade less than required, or when source samples did not meet all the recommended standards (which have no health implications) or when some of the distribution system samples exceeded mandatory standards. Should a whole supply be condemned on the basis of this last item?

Without going into further details, the foregoing should indicate some of the problems that have occurred in the New York SMSA with regard to the ICWS program.

In order to eliminate some of the foregoing difficulties and maintain a program that is without question needed to assure safe drinking water for the public, it is recommended that:

1. Consideration be given to a new rating system that will in some measure eliminate the problems arising from present misinterpretations.

2. Regional office staff be expanded to carry out an adequate program or that assistance be made available when extra workloads are imposed.

# APPENDICES
# COMMUNITY WATER SUPPLY STUDY
# NEW YORK
# STANDARD METROPOLITAN STATISTICAL AREA

PAGE

A. CORRESPONDENCE PRIOR TO INITIATION OF CWSS ____ A2

B. DATA SUMMARIES AND OTHER INFORMATION FOR EACH COUNTY AND NEW YORK CITY ____ A9

1. Rockland County ____ A10
2. Westchester County ____ A22
3. New York City ____ A48
4. Nassau County ____ A69
5. Suffolk County ____ A88

   a. Brief Description of County Operation
   b. Letter to Water Purveyor
   c. Data Summary
   d. Listing of Water Supplies in the CWSS
   e. Map of Water Supplies
   f. Summary of Inventory Data
   g. Listing of samples for which values exceeded standards
   h. Comments on water supply systems
   i. Comments - Cross-Connection Study
   j. Additional Data and Information

C. NEW YORK STATE - DEPARTMENT OF HEALTH ____ A113

   Drinking Water Standards ____ A116
   Sanitary Code - Drinking Water Supplies ____ A119
   Form 255 Summary of Annual Inspection of Public Water Supply ____ A128

D. WATER RESOURCES - PROJECT ILLUSTRATIONS ____ A130

   a. CPWS-27 City of New York and County of Westchester ____ A131
   b. Corps of Engineers, NEWS Study ____ A135

E. COMPUTER ANALYSIS - EVALUATION CRITERIA ____ A139

F. FORMS USED TO COLLECT, RECORD AND ANALYZE DATA ____ A154

G. DEFINITIONS ____ A169

# APPENDIX A CORRESPONDENCE PRIOR TO INITIATION OF THE COMMUNITY WATER SUPPLY STUDY - NEW YORK STATE DEPARTMENT OF HEALTH AND U. S. PUBLIC HEALTH SERVICE

1. Assistant Surgeon General Chris A. Hansen to Commissioner Hollis S. Ingraham, M. D., March 5, 1969
2. Commissioner Ingraham to Assistant Surgeon General Chris A. Hansen, March 17, 1969
3. Assistant Surgeon General Chris A. Hansen to Deputy Commissioner Dwight F. Metzler, M. D., April 8, 1969
4. Mr. Everett L. MacLeman, Regional Representative to Mr. John C. Bumstead, Director, Bureau of Water and Sewage Utilities Management, April 8, 1969

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CONSUMER PROTECTION AND ENVIRONMENTAL HEALTH SERVICE
ROCKVILLE, MARYLAND 20852

ENVIRONMENTAL CONTROL
ADMINISTRATION

MAR 5 1969

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Hollis S. Ingraham, M. D.
Commissioner
State Department of Health
84 Holland Avenue
Albany, New York 12208

Dear Dr. Ingraham:

Over the years the Public Health Service has had excellent relations with the States in the joint activities relating to the interstate carrier water supplies and to their improvements. National interests require that we conduct a survey to reassess the problems and needs and determine gaps that might exist in the present community water supply activities. In order that we may get factual information in a rather short period of time, we are asking several States to cooperate with us in a limited survey of selected metropolitan areas that are representative of the major water problems.

We in ECA are concerned about the health implications of the ever-increasing load of organic and inorganic chemical contaminants finding its way into our drinking water. The emphasis during the past few years on water pollution control has resulted in a deemphasis of the recognition of the problems besetting the treatment and quality control of our public drinking supplies. We feel this situation should be corrected.

Our Bureau of Water Hygiene has been directed to start a study to determine if the American consumer's drinking water meets PHS "Drinking Water Standards." If some are found that do not meet standards, I have asked them to relate these findings to national trends and to propose programs on how the community water supplies of this nation can be upgraded to assure that the public has a safe and satisfactory water supply. This will include the future role of the Bureau of Water Hygiene, needs of State and local programs, investments, methodological changes, and research needed to correct deficiencies noted in drinking water quality.

Coverage of the study will be nationwide with an investigation of the water supplies in one metropolitan area in each of HEW's nine regions. The study areas have been selected to include the diversity of water supply practices in this country from the use of surface water from protected watersheds in the northeast to the heavy use of mineralized waters in the southwest.

The whole Standard Metropolitan Statistical Area (SMSA) will be studied to determine the interaction and coverage of both the large and smaller supplies that serve these population concentrations. This will give a more complete understanding of the drinking water exposure of a mobile population at home, at work, and when recreating.

For your State we are suggesting New York City (including the Boroughs of Queens, Kings, Manhattan, Staten Island, and the Bronx) with the surrounding Counties of Rockland, Westchester, Suffolk, and Nassau. To satisfactorily conduct this study, it is essential that it be made with your cooperation and assistance as well as that of the local water utilities concerned. You will be provided with the initial study findings as soon as it is practical.

I hope that you and your staff will be able to assist us in this study. You will be contacted by our Bureau of Water Hygiene Regional Representative who will give you more details and schedule the activities to your convenience.

Sincerely yours,

/s/ Chris A. Hansen

Chris A. Hansen
Assistant Surgeon General
Commissioner

STATE OF NEW YORK
DEPARTMENT OF HEALTH
ALBANY

HOLLIS S. INGRAHAM, M.D.
COMMISSIONER

March 17, 1969

Dear Mr. Hansen:

Thank you for your letter of March 5, 1969 concerning the proposed study to determine if the drinking water from the water supplies in the New York City Standard Metropolitan Statistical Area meets the PHS "Drinking Water Standards."

I understand that Mr. Metzler has talked with you on the telephone about our cooperation. Mr. Metzler has indicated that he is pleased with the agreement between the two of you concerning the timing, the joint conduct of this study and the joint preparation of the report.

Staff of our Division of Pure Waters and our Office of New York City Affairs will be looking forward to cooperating with your Bureau of Water Hygiene representatives in this joint venture.

Sincerely yours,

Hollis Ingraham

Hollis S. Ingraham, M.D.
Commissioner of Health

Mr. Chris A. Hansen
Assistant Surgeon General
Commissioner
Department of Health, Education
and Welfare
Public Health Service
Rockville, Maryland 20852

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BUREAU OF [illegible]

Environmental Control Administration
Office of the Commissioner
MAR 24 1969

APR 9 1969

4/8/69

Dr. Dwight F. Metzler
Deputy Commissioner
State of New York
  Department of Health
Albany, New York 12208

Dear Dr. Metzler:

I would like to thank you for the cooperation you have given to our staff in the development of procedures for the conduct of the Community Water Supply Study in the New York SMSA.

Dr. Ingraham's kind letter was also greatly appreciated.

Sincerely yours,

/S/ Chris A. Hansen

Chris A. Hansen
Assistant Surgeon General
Commissioner

cc:
✓G. Hansler, Region II, CPE
E. Maclennan
Through R. Van Derwerker

WHLONG:fls 4/2/69
Official file located in ECA-BWH
  Room 130, T-1

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
REGION II
FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10007

PUBLIC HEALTH SERVICE
ENVIRONMENTAL HEALTH SERVICE

212 264-2523

April 8, 1969

Mr. John C. Bumstead, Director
Bureau of Water & Sewage
Utilities Management
State Department of Health
84 Holland Avenue
Albany, New York 12208

Dear Mr. Bumstead:

I have just received a copy of Dr. Ingraham's reply of March 17 to Mr. Hansen's letter of March 5 relative to the Community Water Supply Study for the New York City Standard Metropolitan Statistical Area.

It is my understanding that the Regional Representative for the Bureau of Water Hygiene is responsible for conducting the survey and the preparation of the report. I am pleased that Mr. Metzler favors a joint effort relative to both of these items.

In conducting the survey we would appreciate having your Regional Staff make the initial contacts with the local officials. I well realize that the amount of field work participation on their part is wholly dependent upon their work load. Any assistance will be more than appreciated. However, relative to the preparation of the report, I would like as much assistance as possible.

In reviewing the preliminary work on the report, I would like to suggest meetings be held in New York City with representatives from your office, and the Regional Office in White Plains and the Office of New York City Affairs. Personnel from the New York City Department of Water Resources and Health Department, along with representatives from the four counties, will also be a part of the review group. The meetings would be held only after each section has been reviewed by the individuals. In view of the tremendous amount of effort both in the field and office, we are setting a date of November 12, 1969 as the earliest for completion and possible release; however, this might be a little optimistic.

We in the Regional Office are looking forward to working on this study. Our past contact with New York State would seem to indicate that this part of our country-wide study is going to provide guidelines as to research that should be done by the Public Health Service and how things should be done to meet the Drinking Water Standards, both from example and future planning now underway in the area.

I am looking forward to discussing the survey with you in your office at 9:00 a.m. on Friday, April 18.

Sincerely yours,

Everett L. MacLeman

Everett L. MacLeman
Regional Representative
Bureau of Water Hygiene
Environmental Control Administration

# APPENDIX B DATA SUMMARIES AND OTHER INFORMATION FOR EACH COUNTY AND NEW YORK CITY

1. Rockland County
2. Westchester County
3. New York City
4. Nassau County
5. Suffolk County

## Rockland

In Rockland County, responsibility for water supplies is in the Division of Environmental Health of the Rockland County Department of Health.

Division staff with the assistance of the utility staff collect water supply samples. Chemical analysis is performed by the New York State Health Department's Division of Laboratories and Research in Albany. Bacteriological samples are sent to the Westchester County laboratory facilities at Grasslands. About 1,000 samples are analysed each year under a contract arrangement with Westchester County.

The two major supplies, Spring Valley (170,000) and Nyack (15,000) serving 185,000 of the 218,837 on public water supplies in the county, have their own state approved laboratories.

Although staff vacancies do not permit all the sanitary surveys planned, the larger supplies serving 97% of the population are inspected annually.

Currently three engineering and several sanitarian vacancies have placed a very heavy load on existing staff.

Rockland is the only county in the New York Standard Metropolitan Statistical Area without laboratory facilities. If one of the planned state laboratories is not located nearby in the immediate future, consideration should be given to the establishment of county facilities.

ROCKLAND COUNTY DEPARTMENT OF HEALTH

50 SAMSONDALE PLAZA
WEST HAVERSTRAW, N.Y. 10993

AREA CODE 914
PHONE 947-1500

B. A. VANADZIN, M.D.
Commissioner of Health

WILLIAM S. WALDRON, M.D.
Deputy Commissioner

April 28, 1969

Dear Sir:

The United States Public Health Service in cooperation with the Rockland County Health Department and the New York State Health Department is planning a special survey of all domestic water systems in Rockland, Westchester, Nassau, Suffolk Counties, and the five boroughs of New York City. The survey will begin on May 1, 1969. This study is a portion of a nationwide survey being carried out in nine areas throughout the Unites States, one in each U. S. Public Health Service Region.

The purpose of this study is to determine if the water being served in domestic systems meets the Public Health Service's Drinking Water Standards. The Public Health Service will not only review the bacteriological and chemical history of the water supplies surveyed, but will also collect samples for their own analysis. In addition, a sanitary survey will be made of the water system, facilities, and operation.

Your office will be contacted in the near future by the Public Health Service, and an appointment made for the survey at a mutually agreeable time.

Your cooperation in this will be sincerely appreciated.

Very truly yours,

George E O'Keefe

George E. O'Keefe, P. E.
Assistant Commissioner for
Environmental Health

GEO'K:hp

**SUMMARY:** Based on systems studies

Total Population - 218,837

Population served by public water supply systems (Includes 1,510 summer residents) - 211,571

Population not served by public water supply systems - 8,776

Total number of supply systems (Municipally, publicly owned 3, privately owned 10, Institutional 7) - 36

Sources - Surface 10 Ground 99

Consumption - Average Day 21.660 MGD for 25 supplies reporting

Number of supply systems serving 1,000 or less - 29

Number of Bacteriological Samples required annually to meet PHS Standards - 2,676

Number of Bacteriological Samples required annually to meet New York State Standards - 1,728

Number of supply systems taking sufficient samples to meet PHS Standards - 0

Number of supply systems taking sufficient samples to meet New York State Standards - 0

Number of additional samples supply systems would have to meet New York State Standards - 677

| | No. of Systems | Pop Served |
|---|---|---|
| Fluoridated | 0 | 0 |
| Operator holds State license | 6 | 200,600 |
| Operator license not required - no treatment | 27 | 10,756 |
| Unlicensed operator-violation of State Sanitary Code | 3 | 215 |
| Chlorinating | 10 | 194,415 |
| Chlorination not required - source wells only | 25 | 17,041 |
| Not chlorinating-violating State Sanitary Code | 1 | 115 |
| Supply systems served by a State Approved Laboratory | 35 | 211,538 |
| Supply systems having a chemical analysis | 16 | 208,020 |
| Supply systems having a radiological analysis | 4 | 175,360 |
| Supply systems having a sanitary survey | 8 | 208,620 |
| Cross-Connection - code | 9 | 186,400 |
| Cross-Connection - active program | 1 | 15,000 |

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## LISTING OF WATER SUPPLIES IN THE COMMUNITY WATER SUPPLY STUDY

## ROCKLAND COUNTY

| Code R- | Name of Water Supply | Location |
|---|---|---|
| 1 | Pothat Water Co | Sloatsburg, N.Y. |
| 2 | Spring Valley Water Co | Office - Weehawken, N.J. |
| 3 | New York State Rehabilitation Hospital | West Haverstraw, N.Y. |
| 4 | Garnerville Holding Corp | West Haverstraw, N.Y. |
| 5 | Lake Lucille Property Owners Assoc | New City, N.Y. |
| 6 | St. Dominic's Home | Blauvelt, N.Y. |
| 7 | St. Agatha's Home | Nanuet, N.Y. |
| 8 | Hillburn Water Supply | Hillburn, N.Y. |
| 9 | Suffern Water Department | Suffern, N.Y. |
| 10 | Keller's Apartment | Garnerville, N.Y. |
| 11 | St. Agnes Home for Boys | Sparkill, N.Y. |
| 12 | Nyack Water Department | Nyack, N.Y. |
| 13 | Blue Bird or Pidgeon's Trailer Park | Mt. Ivy, N.Y. |
| 14 | Tagaste Seminary | Suffern, N.Y. |
| 15 | Saint Mary's Villa | Sloatsburg, N.Y. |
| 16 | Clark Trailer Park | Mt. Ivy, N.Y. |
| 17 | Mazza and Leone Trailer Park | Mt. Ivy, N.Y. |
| 18 | Tolstoy Foundation | Valley Cottage, N.Y. |
| 19 | Rockland State Hospital | Orangeburg, N.Y. |
| 20 | Parkway Beach Club | Mt. Ivy, N.Y. |
| 21 | Ed Locke Water Company | Valley Cottage, N.Y. |
| 22 | Wexler Bungalows | Garnerville, N.Y. |
| 23 | Mt. Vien Trailer Park | Stony Point, N.Y. |
| 24 | Letchworth Village | Thiels, N.Y. |
| 25 | Bell and Company | Orangeburg, N.Y. |
| 26 | Camp Jawonia | New City, N.Y. |
| 27 | Mt. Ivy Trailer Park | Mt. Ivy, N.Y. |
| 28 | Joy Acres, Inc | Valley Cottage, N.Y. |
| 29 | Birchwood Bungalow Colony | Haverstraw, N.Y. |
| 30 | Simon's Bungalows | Spring Valley, N.Y. |
| 31 | Camp Addisone Boyce | Tompkins Cove, N.Y. |
| 32 | Camp Bullowa Water Supply | Stony Point, N.Y. |
| 34 | Camp Ramaquois | Pomona, N.Y. |
| 35 | Camp Williams | Suffern, N. Y. |
| 42 | Floridian Cottages Water Supply | Rockland Lake, N.Y. |
| 44 | Camp Lou Acres Water Supply | Spring Valley, N.Y. |

KEY: For Table 2-R

Ownership
M - Municipal or community public water supply system publicly owned
C - Municipal or community public water supply system privately owned
S - Systems covering trailer and mobile home parks, camps, institutions, etc.

Sampling
Total number of samples collected for system during CWSS for all tests

Source of Water
S - Surface
G - Ground
A - New York City Aqueducts
O - Other System

MGD - Million gallons per day
Y - Yes
N - No
Rad - Radiological
Chem - Chemical

Cross-Connections
Code - Using local or state code
Prog - Active continuing program

Chlorination
Y - System chlorinating
NR - Not required
R - Required

Additional Treatment
C - Chemicals used
S - Sedimentation
F - Filtration
S - Softening
I - Iron and manganese removal

Complaints
(Most frequent as reported by water utility staff)
Oper - Complaints by operator
Cust - Complaints by customer
Mang - Complaints by management

Licensing
LNR - License not required
LR - License required
(Otherwise grade is indicated)

Annual Bacteriological Sampling, Frequency Meets Requirements - NYS, PHS
Annual Bacteriological Sampling Frequency Meets Requirements of New York State - Public Health Service

( ) * Summer

( ) ** Bottle Water Supply

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-R

| Code R- | Population Served | Ownership | Total Samples-CWSS | Source |  |  |  | Average Day MGD | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections |  | Chlorination | Fluoridation | Additional Treatment | Complaints |  |  | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  | S | G | A | O |  |  |  |  |  | Code | Prog |  |  |  | Oper | Cust | Mang |  | NYS | PHS |
| 1 | 3,000 | C | 10 | 2 |  |  |  | 0.200 | Y | Y | N | Y | Y | N | Y | N | N | N | T&O | N | IIIB |  |  |
| 2 | 170,000 | C | 40 | 2 | 42 |  |  | 16.400 | Y | Y | Y | Y | Y | N | Y | N | CFS | N | T&O | N | IA |  |  |
| 3 | 500 | S | 8 | - | 2 |  |  | 0.070 | Y | Y | N | Y | N | N | NR | N | N | N | N | N | LNR |  |  |
| 4 | 600 | C | 6 | - | 1 |  |  | 0.100 | Y | Y | Y | N | N | N | NR | N | N | N | N | N | LNR |  |  |
| 5 | 160 | C | 6 | - | 1 |  |  | 0.010 | Y | Y | Y | Y | Y | N | Y | N | N | N | N | N | LR |  |  |
| 6 | 300 | S | 8 | - | 1 |  |  | 0.040 | Y | Y | N | Y | N | N | Y | N | N | N | N | N | LNR |  |  |
| 7 | 600 | S | 8 | - | 1 |  |  | 0.050 | Y | N | N | Y | N | N | NR | N | N | N | N | More Help | LNR |  |  |
| 8 | 1,000 | M | 10 | 1 | 1 |  |  | 0.030 | Y | Y | N | Y | Y | N | Y | N | N | N | N | N | IIIB |  |  |
| 9 | 7,000 | M | 6 | - | 2 |  |  | 1.000 | Y | Y | N | Y | Y | N | NR | N | N | N | Cost | N | III |  |  |
| 10 | 25 | S | 6 | - | 1 |  |  | - | Y | Y | N | N | N | N | Y | N | N | N | Chlor | N | LR |  |  |
| 11 | 260 | S | 6 | - | 1 |  |  | 0.015 | Y | Y | N | Y | N | N | NR | N | N | N | N | N | LNR |  |  |
| 12 | 15,000 | M | 10 | 1 | - |  |  | 1.350 | Y | Y | N | Y | N | Y | Y | N | CSF | Person | Dirt | Pump | IIA |  |  |
| 13 | 33 | S | 8 | - | 1 |  |  | 0.002 | N | N | N | N | N | N | NR | N | N | N | N | N | LNR |  |  |
| 14 | 50 | S | 6 | - | 1 |  |  | - | Y | Y | N | N | N | N | NR | N | N | N | N | N | LNR |  |  |

### SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-R

| Code R- | Population Served | Ownership | Total Samples-CWSS | Source |  |  |  | Average Day MGD | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections |  | Chlorination | Fluoridation | Additional Treatment | Complaints |  |  | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  | S | G | A | O |  |  |  |  |  | Code | Prog |  |  |  | Oper | Cust | Mang |  | NYS | PHS |
| 15 | 115 | S | 12 | 1 | - |  |  | 0.010 | Y | Y | N | Y | N | N | R | N | N | New Source | N | Budget | LNR |  |  |
| 16 | 50 | S | 6 | - | 1 |  |  | 0.003 | Y | N | N | N | N | N | NR | N | N | N | N | N | LNR |  |  |
| 17 | 85 | S | 6 | - | 2 |  |  | - | Y | N | N | N | N | N | NR | N | N | N | N | N | LNR |  |  |
| 18 | 150 | S | 6 | - | 2 |  |  | - | Y | N | N | Y | N | N | NR | N | N | N | N | N | LNR |  |  |
| 19 | 5,300 | S | 8 | - | 4 |  |  | 0.880 | Y | Y | N | Y | N | N | NR | N | N | N | Dirt | Wells | LNR |  |  |
| 20 | 250 | C | 6 | - | 1 |  |  | 0.015 | Y | N | N | N | N | N | NR | N | N | N | N | N | LNR |  |  |
| 21 | 30 | C | 6 | - | 1 |  |  | 0.002 | Y | N | N | Y | N | N | Y | N | F | N | N | N | LR |  |  |
| 22 | 40 | S | 6 | - | 2 |  |  | 0.003 | Y | N | N | N | N | N | NR | N | N | N | N | N | LNR |  |  |
| 23 | 200 | S | 6 | - | 3 |  |  | - | Y | N | N | N | N | N | NR | N | N | N | N | N | LNR |  |  |
| 24 | 4,600 | S | 11 | 3 | - |  |  | 0.670 | Y | Y | Y | Y | Y | N | Y | N | CFS | N | N | N | II |  |  |
| 25 | 48 | C | 8 | - | 2 |  |  | - | Y | N | N | N | N | N | NR | N | N | N | Rust | N | LNR |  |  |
| 26 | 125 | S | 6 | - | 1 |  |  | 0.020 | Y | N | N | N | N | N | NR | N | N | N | N | N | LNR |  |  |
| 27 | 550 | S | 6 | - | 5 |  |  | 0.080 | Y | N | N | N | N | N | NR | N | N | N | N | N | LNR |  |  |

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-R

| Code R- | Population Served | Ownership | Total Samples-CWSS | Source | | | | Average Day | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections | | Chlorination | Fluoridation | Additional Treatment | Complaints | | | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S | G | A | O | MGD | | | | | Code | Prog | | | | Oper | Cust | Mang | | NYS | PHS |
| 28 | (120)* | S | 6 | - | 2 | | | 0.010 | Y | Y | N | N | N | N | NR | N | N | N | N | N | LNR | | |
| 29 | (200)* | S | 6 | - | 2 | | | - | Y | N | N | N | N | N | NR | N | N | N | N | N | LNR | | |
| 30 | (100)* | S | 6 | - | 2 | | | - | Y | N | N | N | N | N | NR | N | N | N | N | N | LNR | | |
| 31 | (225)* | S | 6 | - | 1 | | | - | Y | N | N | Y | N | N | NR | N | N | N | N | N | LNR | | |
| 32 | (300)* | S | 12 | - | 3 | | | - | Y | N | N | Y | Y | N | Y | N | N | N | N | N | LNR | | |
| 34 | ( 90)* | S | 8 | - | 2 | | | 0.160 | Y | N | N | Y | Y | N | NR | N | N | N | N | N | LNR | | |
| 35 | (192)* | S | 8 | - | 4 | | | 0.500 | Y | N | N | N | N | N | NR | N | N | N | N | N | LNR | | |
| 42 | ( 33)* | S | 6 | - | 2 | | | - | Y | N | N | N | N | N | NR | N | N | - | - | - | LNR | | |
| 44 | (250)* | S | 8 | - | 2 | | | 0.040 | Y | N | N | N | Y | N | NR | N | N | N | N | N | LNR | | |

## TABLE 3-R

## VALUES EXCEEDING DRINKING WATER STANDARDS
(Based on Community Water Supply Study Sampling Only)

| Code R- | Constituents | Finished Water | Distribution System 1 | Distribution System 2 | Distribution System 3 |
|---|---|---|---|---|---|
| 3 | M-Coli(1) | | 24 | 1 | - |
| 6 | M-Pb(0.05)+ | 0.037 | 0.101 | .009 | - |
| 9 | Mn(0.05) | - | 0.240 | 0.477* | |
| 10 | Fe(0.3) | 0.067 | 0.542 | - | - |
| 10 | Cu(1.0) | 0.076 | 1.225 | - | - |
| 10 | TDS(500) | 506.3 | - | - | - |
| 13 | M-Pb(0.05) | 0.008 | 0.074 | 0.000 | - |
| 13 | Zn(5.0) | 0.048 | 32.0 | 0.052 | - |
| 16 | Mn(0.05) | - | 0.656* | 0.296 | - |
| 25 | Fe(0.3) | 0.012 | 4.50 | 1.524 | |
| 28 | M-Coli(1) | - | 7 | 0 | |
| 28 | Mn(0.05) | - | 0.071 | 0.010 | |
| 31 | Mn(0.05) | 0.169 | 0.111 | 0.114 | - |

Finished Water - as delivered to distribution system, treated or untreated

| | |
|---|---|
| ( ) | Public Health Service, Drinking Water Standards |
| M | Mandatory Standard |
| ____ | Exceeds Standard |
| * | Exceed New York State Health Department limit of 0.3 ppm for Manganese |
| + | Average of samples did not exceed standard |

## COMMENTS ON WATER SUPPLY SYSTEMS LISTED IN TABLE 3-R

R- 3 New York State Rehabilitation Hospital

This state institution serves 500 from two wells. One distribution system sample had a verified coliform count of 24. Recommendations made by the county health department based on a sanitary survey resulted in zero coliform counts on resampling at six different times during the succeeding six months.

R- 6 St. Dominic's Home

This institution serves 300 from a well. One lead sample had 0.101 ppm, a value that exceeds both the New York State and Public Health Service standards of 0.05 ppm. Two other samples, one of which was the finished water, were well within the standard.

R- 9 Suffern Water Department

This is a municipal supply serving 7,000 from two wells. Two distribution samples had manganese contents of 0.240 ppm and 0.477 ppm. Although both values exceed the Public Health Service recommended standard only the latter exceeded the New York State standard.

R-10 Keller's Apartment

This community supply serves 25 people from one well. The distribution system sample had 0.542 ppm of iron and 1.225 ppm of copper. (Public Health Service and State recommended standards for these constituents are 0.3 and 1.0) County records show an average of 0.16 ppm for iron and 0.2 ppm for copper.

R-13 **Blue Bird or Pidgeon's Trailer Park**

This community supply with one well serves 33 people. One distribution sample contained 32 ppm of zinc (5.0) and 0.074 ppm of lead (0.05).

R-16 **Clark Trailer Park**

This is a community supply serving 50 people from a single well. Two distribution samples had manganese content of 0.296 ppm and 0.656 ppm. While both exceeded the Public Health Service recommended standard the latter also exceeded the New York State standard.

R-25 **Bell and Company**

A community supply serving 48 people from two wells had two distribution samples with iron results of 4.5 ppm and 1.524 ppm, both of which exceed the recommended limit of 0.3 ppm.

R-28 **Joy Acres, Inc.**

This is a community summer supply with two wells serving 120 people. One sample had a verified coliform count of 7, the other was 0. Manganese results were 0.071 ppm and 0.010 ppm. The 0.071 ppm exceeds the Public Health Service limit of 0.05 ppm, but not the New York State standard of 0.3 ppm. When county staff rechecked the system, samples showed both constituents to be within standards.

R-31 **Camp Addison Boyce**

This summer camp supply serving 225 from a well had manganese in its source 0.169 ppm and distribution samples 0.111 and 0.114 ppm all of which exceeded the Public Health Service standard, but not the New York State standard of 0.3 ppm.

ROCKLAND COUNTY

## EXCERPT FROM CROSS-CONNECTION CONTROL REPORT

Terrance L. Campbell, PHS Engineer

Code
R-

2 Spring Valley Water Company, Oradell, New Jersey

| | |
|---|---|
| Population Served | 170,000 |
| Number of establishments visited | 3 |
| Number of hazards observed-Total | 12 |
| Hospital | 7 |
| Sewage Treatment Plant | 0 |
| Metal Plating Plant | 5 |

This water company frequently checks new customers for the existence of private wells. If wells exist, no records are kept. The water company does not maintain a continuous program for the detection and elimination of plumbing hazards. The authorities contacted indicated that most of the municipal areas being served had inadequate codes to allow continuous reinspections. Any cross-connection inspections are done only as a result of a complaint. Much more emphasis on cross-connection control is required by this water supply.

## WESTCHESTER

In the Westchester County Health District, responsibility for water supply systems lies in the Division of Environmental Health in the Westchester County Department of Health. For the cities of New Rochelle and Yonkers, the water supply systems are the responsibility of the City Health Departments.

The Westchester County Water Agency in the Department of Public Works is responsible for the overall coordination of water supply systems relative to such matters as quantity, interconnection, et cetera. This agency's only purpose is for assisting local companies.

The Westchester County Department of Laboratories and Research has outstanding laboratory faciltiies at Grasslands. Personnel requirement range from two years of college and one year of experience for technicians to a Master's Degree and three years of responsible experience for the assistant chief of Laboratories. This well staffed laboratory runs bacteriological, chemical, and physical tests for drinking water supply systems. During 1969 the laboratory analyzed 6,642 water supply samples for bacteria. Both the multiple tube and membrane filter methods are used. Also in 1969, 6,076 tests were run on 32 different chemical and physical items.

Contract arrangements with Rockland County and some City Hall departments imposes an additional water analysis load on the facilities. Laboratory is also responsible for other testing such as milk, food, air and non-potable water.

The Director of the Division of Environmental Health was appointed eight months prior to the initiation of the CWSS. Presently an expanded water supply program is seeking stricter compliance with the New York State Code. The Division has four field offices covering the county. The staff at each office consists of one engineer and two to four sanitarians or environmental health technicians to handle complaints, review plans for extensions and maintains close liaison with water supply systems. The main office reviews major plans and is in charge of the annual complete sanitary survey of each water supply system. Present staff, in addition to the director, includes an assistant engineer and an environmental health technician with a vacancy for one engineer.

Relative to bacterial sampling, water supply systems are responsible for meeting state requirements through an approved laboratory. County runs routine checks throughout the year.

County of Westchester
DEPARTMENT OF HEALTH
County Office Building
White Plains, N. Y. 10601

COUNTY BOARD OF HEALTH
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WILLIAM J. FARRELL, M.D.
DEPUTY COMMISSIONER
DOMENICK K. GALLUZZO, M.D.
DISTRICT HEALTH DIRECTOR

May 15, 1969

Dear Sir:

The United States Public Health Service in cooperation with the Westchester County Health Department and the New York State Health Department is planning a special survey of all domestic water systems in Rockland, Westchester, Nassau, Suffolk Counties, and the five boroughs of New York City. The survey will begin on May 1, 1969. This study is a portion of a nationwide survey being carried out in nine areas throughout the United States, one in each U. S. Public Health Service Region.

The purpose of this study is to determine if the water being served in domestic systems meets the Public Health Service's Drinking Water Standards. The Public Health Service will not only review the bacteriological and chemical history of the water supplies surveyed, but will also collect samples for their own analysis. In addition, a sanitary survey will be made of the water system, facilities, and operation.

Your office will be contacted in the near future by the Public Health Service, and an appointment made for the survey at a mutually agreeable time.

Your cooperation in this will be sincerely appreciated.

Very truly yours,

CEWeber

C. E. Weber, P.E.
Director
Division of Environmental Sanitation

CEW:pdv

## SUMMARY

Total Population - 933,200

Population served by public water supply systems (Includes 1,650 summer residents) 650, one bottled water plant 1,000) - 922,850

Population not served by public water supply systems - 12,000

Total number of supply systems - 54
(Municipally, publicly owned 35, privately owned 14, Institutional 5)

Sources - Surface 22 - Ground 74 - New York City Aqueducts 31
Other 6

Consumption - Average Day 111.783 MGD for 51 supply systems reporting

Number of supply systems serving 1,000 or less - 18

Number of Bacteriological Samples required annually to meet PHS Standards - 11,665

Number of Bacteriological Samples required annually to meet New York State Standards - 6,410

Number of supply systems taking sufficient samples to meet PHS Standards - 5

Number of supply systems taking sufficient samples to meet New York State Standards - 18

Number of additional samples supply systems would have to meet New York State Standards - 1,716

| | No. of Systems | Pop Served |
|---|---|---|
| Fluoridated | 15 | 698,860 |
| Not Fluoridated | 39 | 223,990 |
| Operator holds State license | 28 | 831,278 |
| Operator license not required - no treatment | 18 | 59,249 |
| Unlicensed operator-violation of State Sanitary Code | 8 | 31,325 |
| Chlorinating | 42 | 914,991 |
| Chlorination not required - source wells only | 12 | 6,859 |
| Not chlorinating-violating State Sanitary Code | 0 | 0 |
| Supply systems served by a State Approved Laboratory | 54 | 921,860 |
| Supply systems having a chemical analysis | 50 | 919,562 |
| Supply systems having a radiological analysis | 31 | 844,931 |
| Supply systems having a sanitary survey | 43 | 914,327 |
| Cross-Connection - code | 29 | 830,753 |
| Cross-Connection - active program | 16 | 629,578 |

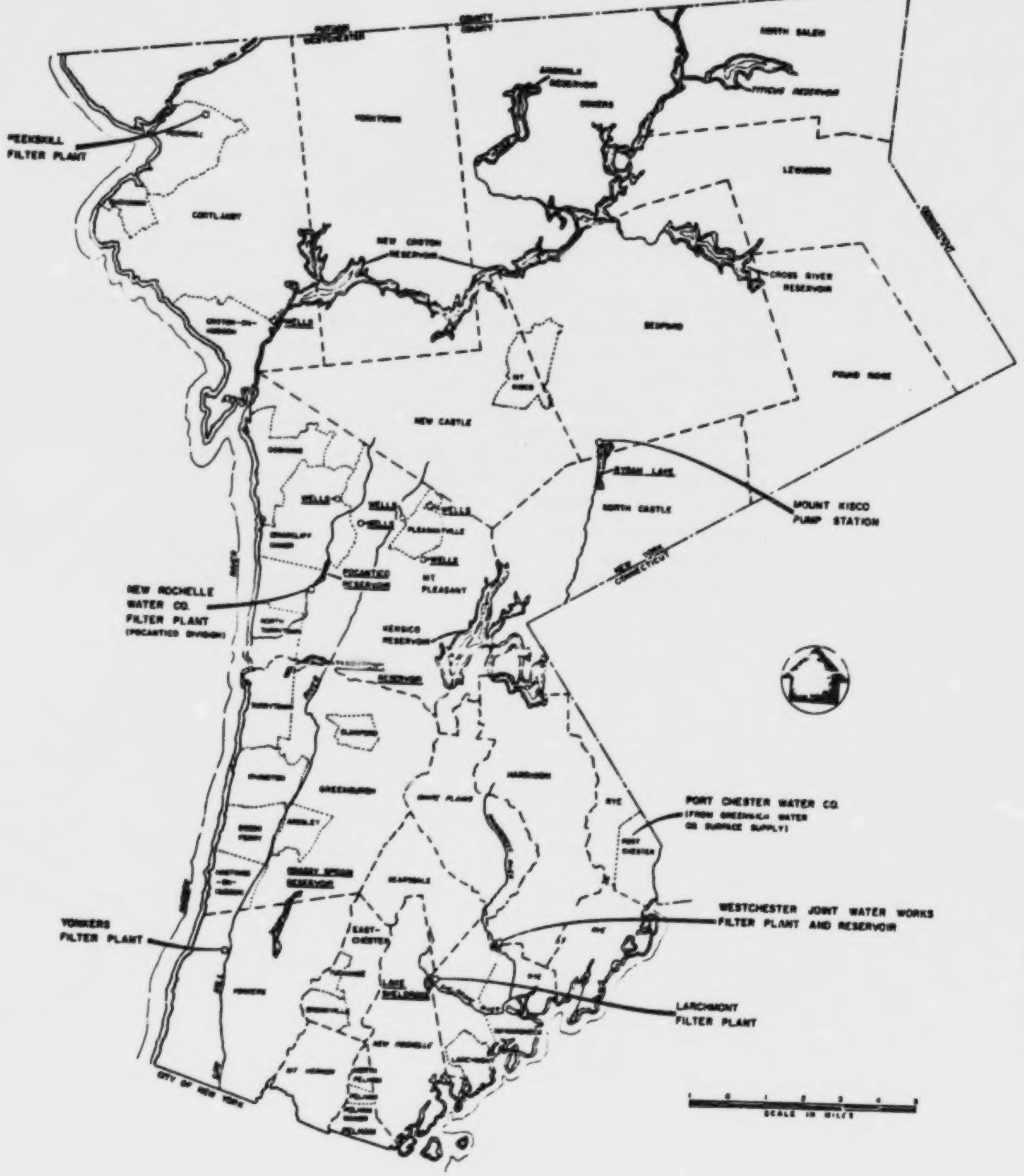
30 supply systems serving 818,251 purchase water from New York City water through another system
13 of the 30 also have their own sources as a supplement or standby

## LISTING OF WATER SUPPLIES IN THE COMMUNITY WATER SUPPLY STUDY

## WESTCHESTER COUNTY

| Code W- | Name of Water Supply | Location |
|---|---|---|
| 1 | Amanwalk Heights Water District | Somers, N.Y. |
| 2 | Amawalk-Shenorock Water Dist | Shenorock, N.Y. |
| 5 | Bedford Farms Water District | Bedford, N.Y. |
| 6 | Bedford Water Storage & Distrib./Dist #1 | Katonah, N.Y. |
| 8 | Briarcliff Manor Water Supply | Briarcliff Manor, N.Y. |
| 9 | Village of Buchanan Water Supply | Buchanan, N.Y. |
| 11 | Continental Village Water Dist | Phillipstown, N.Y. |
| 12 | Cortlandt Water Districts | Cortlandt, N.Y. |
| 13 | Cortlandt Water Dist #1 | Peekskill, N.Y. |
| 14 | Croton-on-Hudson Water Supply | Croton-on-Hudson, N.Y. |
| 15 | Croton Falls Water Dist | North Salem, N.Y. |
| 16 | Elmsford Water Dept | Elmsford, N.Y. |
| 17 | Goldens Bridge Community Assoc Water Supply | Goldens Bridge, N.Y. |
| 18 | Greenburgh Consolidated Water Dist/#1 | Greenburgh, N.Y. |
| 20 | Westchester County Dept of Public Works "Grasslands" | Valhalla, N.Y. |
| 21 | Harrison Water Dist #1 | Harrison, N.Y. |
| 22 | Hawthorne Improvement Dist | Mt Pleasant, N.Y. |
| 24 | Irvington Water Dist | Irvington, N.Y. |
| 25 | Roosevelt Drive Water Users Assoc | Bedford Hill |
| 26 | Lake Katonah Club | Goldens Bridge, N.Y. |
| 28 | Larchmont Water Dist | Larchmont, N.Y. |
| 31 | Montrose Improvement Supply | Montrose, N.Y. |
| 32 | Mt. Kisco Water Dept | Mt. Kisco, N.Y. |
| 33 | New Castle Water Co | Chappaqua, N.Y. |
| 34 | New Castle Water Dist #1 | Chappaqua, N.Y. |
| 35 | North Castle Water Dist #1 | North White Plains, N.Y. |
| 36 | North Tarrytown Village Water Supply | North Tarrytown, N.Y. |
| 37-38 | New Rochelle Water Co | New Rochelle, N.Y. |
| 39 | Village of Ossining Water Dept | Ossining, N.Y. |
| 40 | Peekskill Water Dist | Peekskill, N.Y. |
| 41 | Pelham Village Water Dept | Pelham, N.Y. |
| 43 | Pleasantville Water Dept | Pleasantville, N.Y. |
| 44 | Greenrock Corporation | Pocantico Hills, N.Y. |
| 45 | Port Chester Water Works, Inc | Port Chester, N.Y. |
| 46 | Salem Acres Assoc | North Salem, N.Y. |
| 47 | Scarsdale Water Dept | Scarsdale, N.Y. |
| 49 | Tarrytown Water Supply | Tarrytown, N.Y. |
| 50 | Thornwood Water Dist | Thornwood, N.Y. |
| 51 | Truesdale Lake Water Supply | Truesdale Lake, N.Y. |
| 52 | Twin Lakes Water Works | South Salem, N.Y. |
| 54 | Usonia Homes | Pleasantville, N.Y. |

| Code W- | Name of Water Supply | Location |
|---|---|---|
| 55 | Sunset Ridge Water Dist | North Salem, N.Y. |
| 56 | Valhalla Water Dist | Valhalla, N.Y. |
| 57 | Westchester Joint Water Works | Mamaroneck, N.Y. |
| 58 | Westfield State Farm | Bedford Hills, N.Y. |
| 59 | White Plains Municipal Water Supply | White Plains, N.Y. |
| 60 | Yorktown Water Storage and Distribution Dist #1 | Shrub Oak, N.Y. |
| 61 | Camp Smith Water Supply | Peekskill, N.Y. |
| 62 | Gramaton Spring Water | Bronxville, N.Y. |
| 63 | Mt Vernon Water Supply | Mt. Vernon, N.Y. |
| 70 | Windmill Farms Water Works | Armonk, N.Y. |
| 71 | Yonkers Water Supply | Yonkers, N.Y. |
| 73 | Lincoln Hall School | Whitehall Corners, N.Y. |
| 74 | Mt. Lake Camp | North Salem, N.Y. |
| 77 | Pabst Water Works, Inc. | North Salem, N.Y. |


PEEKSKILL
FILTER PLANT
YORKTOWN
CORTLANDT
NEW CROTON
RESERVOIR
CROTON-ON-
HUDSON
WELLS
NORTH SALEM
TITICUS RESERVOIR
SOMERS
LEWISBORO
CROSS RIVER
RESERVOIR
BEDFORD
POUND RIDGE
MT
KISCO
NEW CASTLE
OSSINING
WELLS
WELLS
WELLS
WELLS
WELLS
PLEASANTVILLE
POCANTICO
RESERVOIR
MT
PLEASANT
NEW ROCHELLE
WATER CO.
FILTER PLANT
(POCANTICO DIVISION)
KENSICO
RESERVOIR
RESERVOIR
BYRAM LAKE
NORTH CASTLE
MOUNT KISCO
PUMP STATION
NEW YORK
CONNECTICUT
ELMSFORD
GREENBURGH
ARDSLEY
HARRISON
WHITE PLAINS
RYE
PORT CHESTER WATER CO.
(FROM GREENWICH WATER
CO SURFACE SUPPLY)
PORT
CHESTER
GRASSY SPRAIN
RESERVOIR
SCARSDALE
YONKERS
FILTER PLANT
EAST-
CHESTER
WESTCHESTER JOINT WATER WORKS
FILTER PLANT AND RESERVOIR
RYE
LAKE
ISLE
LARCHMONT
FILTER PLANT
YONKERS
NEW ROCHELLE
MT VERNON
LARCHMONT
PELHAM
CITY OF NEW YORK
1 0 1 2 3 4 5
SCALE IN MILES

MAJOR WATER SUPPLIES IN WESTCHESTER COUNTY

KEY: For Table 2-W

Ownership
M - Municipal or community public water supply system publicly owned
C - Municipal or community public water supply system privately owned
S - Systems covering trailer and mobile home parks, camps, institutions, etc.

Sampling
Total number of samples collected for system during CWSS for all tests

Source of Water
S - Surface
G - Ground
A - New York City Aqueducts
O - Other System

MGD - Million gallons per day
Y - Yes
N - No
Rad - Radiological
Chem - Chemical

Cross-Connections
Code - Using local or state code
Prog - Active continuing program

Chlorination
Y - System chlorinating
NR - Not required
R - Required

Additional Treatment
C - Chemicals used
S - Sedimentation
F - Filtration
S - Softening
I - Iron and manganese removal

Complaints
(Most frequent as reported by water utility staff)
Oper - Complaints by operator
Cust - Complaints by customer
Mang - Complaints by management

Licensing
LNR - License not required
(Otherwise grade is indicated)
LR - License required

Annual Bacteriological Sampling, Frequency Meets Requirements - NYS, PHS
Annual Bacteriological Sampling Frequency Meets Requirements of New York State - Public Health Service

( ) * Summer

( ) ** Bottle Water Supply

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-W

| Code W- | Population Served | Ownership | Total Samples-CWSS | Source | | | | Average Day MGD | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections | | Chlorination | Fluoridation | Additional Treatment | Complaints | | | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S | G | A | O | | | | | | Code | Prog | | | | Oper | Cust | Mang | | NYS | PHS |
| 1 | 320 | M | 2 | - | - | - | 1 | -- | Y | Y | N | N | N | N | Y | N | N | N | N | N | LNR | Y | |
| 2 | 500 | M | 10 | - | 1 | - | - | .090 | Y | Y | N | Y | N | N | Y | N | C | Asst | N | N | IIIB | | |
| 5 | 375 | C | 8 | - | 3 | - | - | .016 | Y | Y | N | Y | N | N | NR | N | N | N | Cost | N | LNR | | |
| 6 | 6,000 | M | 8 | - | 2 | - | 1 | 0.600 | Y | Y | Y | Y | N | Y | Y | N | C | Asst | N | Add Source | III | | |
| 8 | 7,800 | M | 9 | - | 6 | 1 | - | 0.860 | Y | Y | Y | Y | Y | N | Y | N | N | N | Rust | Meter Read Time | I | Y | |
| 9 | 2,168 | M | 4 | - | - | 1 | - | 0.492 | Y | Y | Y | Y | Y | N | Y | N | N | - | Turb | N | LNR | | |
| 11 | 2,200 | M | 4 | - | - | 1 | - | 0.090 | Y | Y | Y | Y | N | N | Y | N | N | Surf Lines | Turb | Impro Sys | LNR | | |
| 12 | 16,500 | M | 16 | - | - | 1 | 1 | 1.140 | Y | Y | Y | Y | Y | N | Y | N | N | N | Cost | N | IIB | | |
| 13 | 185 | M | 2 | - | - | 1 | - | 0.010 | Y | Y | Y | Y | N | N | Y | N | N | - | - | - | LR | | |
| 14 | 8,000 | M | 7 | - | 5 | - | - | 0.899 | Y | Y | N | Y | Y | N | Y | N | N | N | Cost<br>Rust | N | III | Y | |

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-W

| Code W- | Population Served | Ownership | Total Samples-CWSS | Source |  |  |  | Average Day MGD | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections |  | Chlorination | Fluoridation | Additional Treatment | Complaints |  |  | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  | S | G | A | O |  |  |  |  |  | Code | Prog |  |  |  | Oper | Cust | Mang |  | NYS | PHS |
| 15 | 2,630 | M | 4 | - | 1 | - | - | 0.014 | Y | Y | N | N | N | N | NR | N | N | N | N | N | LNR |  |  |
| 16 | 5,200 | M | 4 | - | - | 1 | - | 0.450 | Y | Y | Y | Y | N | N | Y | Y | C | N | N | N | LR |  |  |
| 17 | 600 | C | 12 | - | 4 | - | - | -- | Y | Y | N | Y | Y | N | NR | N | N | N | Rust | N | LNR |  |  |
| 18 | 45,000 | M | 12 | - | - | 2 | - | 4.000 | Y | Y | Y | Y | Y | Y | Y | Y | C | N | Cost | Deliv Accts | III | Y |  |
| 20 | 3,500 | S | 4 | - | - | 1 | - | 0.500 | Y | Y | Y | Y | Y | Y | Y | Y | C | N | N | N | III |  |  |
| 21 | 6,000 | M | 8 | - | 2 | 1 | - | 0.610 | Y | Y | Y | Y | Y | N | Y | N | N | N | Cost | N | LR | Y |  |
| 22 | 5,000 | M | 4 | - | - | 1 | 1 | 0.400 | Y | Y | Y | Y | Y | N | Y | Y | N | N | High Pressure | N | IIIB |  |  |
| 24 | 5,800 | M | 10 | 1 | - | 1 | - | 0.700 | Y | Y | Y | Y | Y | Y | Y | N | C | Dirt | Fe<br>Mn | Dead Ends | III |  |  |
| 25 | 63 | C | 4 | - | 3 | - | - | -- | Y | Y | N | Y | N | N | NR | N | N | N | N | Need Maint. Man | LNR |  |  |
| 26 | 340 | C | 7 | - | 1 | - | - | 0.008 | Y | Y | N | N | Y | N | Y | N | N | N | Low Prices | N | LR |  |  |

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

## TABLE 2-W

| Code W- | Population Served | Ownership | Total Samples-CWSS | Source | | | | Average Day MGD | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections | | Chlorination | Fluoridation | Additional Treatment | Complaints | | | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S | G | A | O | | | | | | Code | Prog | | | | Oper | Cust | Mang | | NYS | PHS |
| 28 | 6,860 | M | 10 | 1 | - | 1 | - | 1.000 | Y | Y | Y | Y | Y | Y | Y | Y | C,S F | More Treatment | T&O | N | I | Y | |
| 31 | 3,000 | M | 4 | - | - | 1 | - | 1.500 | Y | Y | Y | Y | Y | N | Y | N | F | N | N | N | IIB | | |
| 32 | 7,000 | M | 10 | 1 | 1 | - | - | 1.000 | Y | Y | Y | Y | N | Y | Y | N | C | N | Cost T&O | N | II | Y | |
| 33 | 800 | C | 10 | 1 | 1 | - | - | 0.075 | Y | Y | N | Y | N | N | Y | N | C,F | T&O Short Filter Run | T&O | T&O Short Filter Run | LR | Y | |
| 34 | 18,000 | M | 4 | - | - | 2 | - | 1.970 | Y | Y | Y | Y | N | Y | Y | N | C | Pump Cap. | Red Water | N | LR | | |
| 35 | 2,000 | M | 8 | - | 1 | 1 | - | 0.250 | Y | Y | Y | Y | Y | N | Y | N | H | N | Rust | N | IIA | | |
| 36 | 8,818 | M | 4 | - | - | 1 | - | 2.170 | Y | Y | Y | Y | N | Y | Y | N | C | N | Rust | N | IIB | | |
| 37-38 | 168,000 | C | 30 | 1 | - | 2 | - | 20.800 | Y | Y | Y | Y | Y | Y | Y | Y | C,S F | Pay | Dirt | N | IB | Y | Y |
| 39 | 25,900 | M | 7 | 1 | 1 | 1 | - | 2.360 | Y | Y | Y | Y | Y | N | Y | N | C,S F | N | Color | N | II | Y | Y |
| 40 | 20,000 | M | 12 | 1 | - | - | - | 5.000 | Y | Y | Y | Y | Y | N | Y | N | C,F | N | Chlor | N | II | Y | Y |

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-W

| Code W- | Population Served | Ownership | Total Samples-CWSS | Source |  |  |  | Average Day | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections |  | Chlorination | Fluoridation | Additional Treatment | Complaints |  |  | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  | S | G | A | O | MGD |  |  |  |  | Code | Prog |  |  |  | Oper | Cust | Mang |  | NYS | PHS |
| 41 | 2,000 | M | 4 | - | - | - | 1 | 0.250 | Y | Y | Y | Y | Y | Y | Y | Y | N | N | Chlor | N | LNR | Y | Y |
| 43 | 7,000 | M | 10 | - | 1 | 1 | - | 0.680 | Y | Y | Y | Y | Y | N | Y | Y | N | Fluor Meter | Cost | N | IIA | Y |  |
| 44 | 200 | C | 10 | 4 | - | - | - | 0.200 | Y | Y | N | Y | Y | N | Y | N | C,S F | N | N | N | LR |  |  |
| 45 | 45,300 | C | 15 | 4 | - | - | - | 6.500 | Y | Y | N | Y | Y | N | Y | Y | C,S F | N | Cost | N | LNR | Y |  |
| 46 | 108 | C | 4 | - | 1 | - | - | -- | Y | Y | N | N | N | N | NR | N | N | N | N | N | LNR |  |  |
| 47 | 22,000 | M | 8 | - | - | 1 | 1 | 2.528 | Y | Y | Y | Y | N | Y | Y | Y | N | Overtime on Auto Control | Rust | N | IIB |  |  |
| 49 | 12,000 | M | 10 | 2 | - | - | - | 1.300 | Y | Y | N | Y | Y | N | Y | N | C,S F | N | T&O Rust | - | IIA | Y |  |
| 50 | 5,000 | M | 6 | - | 1 | 1 | - | 0.350 | Y | Y | Y | Y | N | Y | Y | N | H | N | Hard | N | IIIB |  |  |
| 51 | 400 | C | 8 | - | 2 | - | - | 0.020 | Y | Y | N | N | N | N | Y | N | N | N | N | N | LNR |  |  |

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-W

| Code W- | Population Served | Ownership | Total Samples-CWSS | Source | | | | Average Day | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections | | Chlorination | Fluoridation | Additional Treatment | Complaints | | | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S | G | A | O | MGD | | | | | Code | Prog | | | | Oper | Cust | Mang | | NYS | PHS |
| 52 | 300 | C | 8 | - | 2 | - | - | 0.030 | Y | N | N | N | N | N | NR | N | N | N | Power Loss | N | LNR | | |
| 54 | 188 | C | 8 | - | 1 | - | - | 0.024 | Y | N | N | Y | N | N | NR | N | N | N | N | N | LNR | | |
| 55 | 190 | M | 4 | - | 2 | - | - | 0.006 | Y | Y | N | N | N | N | NR | N | N | N | N | N | LNR | | |
| 56 | 8,000 | M | 4 | - | - | 1 | - | 0.375 | Y | Y | Y | Y | N | N | Y | Y | N | Need Night Oper | Rust | - | IIIB | | |
| 57 | 60,000 | M | 20 | 2 | - | 1 | - | 9.000 | Y | Y | Y | Y | Y | Y | Y | Y | C,S F | Poor Plant Pers | T&O | - | IA | Y | |
| 58 | 600 | S | 6 | - | 7 | - | - | 0.146 | Y | Y | N | N | N | N | Y | N | N | N | N | N | LR | | |
| 59 | 55,000 | M | 20 | 1 | 3 | 1 | - | 6.500 | Y | Y | Y | Y | Y | Y | Y | N | C | More Help | Color | More Help | IIA | | |
| 60 | 28,000 | M | 12 | 1 | 6 | 1 | - | 2.200 | Y | Y | Y | Y | Y | N | Y | Y | C | N | Color | Color | IIB | Y | |
| 61 | 1,600 | S | 8 | - | 2 | - | - | 0.030 | Y | N | N | N | Y | Y | Y | N | H,F | Poor Equip Pay | N | N | IIIB | | |

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-W

| Code W- | Population Served | Ownership | Total Samples-CWSS | Source |  |  |  | Average Day MGD | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections |  | Chlorination | Fluoridation | Additional Treatment | Complaints |  |  | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  | S | G | A | O |  |  |  |  |  | Code | Prog |  |  |  | Oper | Cust | Mang |  | NYS | PHS |
| 62 | (1,000)** | S |  | - | 2 | - | - | 0.001 | Y | N | N | N | - | - | N | - | C,F | Costs | N | Big Companies taking business | N |  |  |
| 63 | 78,000 | M | 12 | - | - | 2 | - | 8.437 | Y | Y | Y | Y | Y | N | Y | Y | N | Low Pay | Dirt<br>Cost<br>Pressure | N | II |  |  |
| 70 | 1,370 | C | 6 | - | 1 | - | - | 0.126 | Y | Y | N | Y | N | N | NR | N | N | N | Cost | N | LNR |  |  |
| 71 | 215,000 | M | 34 | 1 | 1 | 1 | - | 26.000 | Y | Y | Y | Y | Y | Y | Y | Y |  | Trav to check valves | Rust | Old Mains | IIB | Y | Y |
| 73 | 200 | S | 7 | - | 5 | - | - | 0.040 | Y | N | N | N | N | N | NR | N | H | Pipe Breaks | T&O | - | LNR |  |  |
| 74 | ( 650)* | S | 8 | - | 4 | - | - | 0.030 | Y | Y | N | N | N | N | NR | N | C | Line on ground | - | - | LNR |  |  |
| 77 | 185 | C | 8 | - | 1 | - | - | 0.007 | Y | Y | N | N | Y | N | NR | N | N | N | N | N | LNR |  |  |

## TABLE 3-W

### VALUES EXCEEDING DRINKING WATER STANDARDS
(Based on Community Water Supply Study Sampling Only)

| Code W- | Constituents | Finished Water | | Distribution System | | | Number of Samples |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 1 | 2 | 3 | |
| 6 | Mn(0.05) | 0.165 | | 0.158 | 0.041 | | |
| 12 | Fe(0.3) + | NYC | | 0.439 | 0.015L | 0.143NH | 8 |
| 13 | Fe(0.3) | NYC | | 1.40 | - | - | |
| | Mn(0.05) | NYC | | 0.188 | - | - | |
| 14 | Fe(0.3) | 0.588 | | 0.534 | 0.219 | - | |
| | M-Pb(0.05) | 0.497 | | 0.030 | 0.014 | - | |
| | Mn(0.05) | 0.829* | | 0.004 | 0.002 | - | |
| 15 | M-Coli(1) | | | 14 | 1 | - | |
| 17 | Mn(0.05)+ | | | 0.092 | 0.011 | - | |
| 21 | M-Coli(1) | | | 5 | 0 | - | |
| 24 | Mn(0.05) | - | | 0.066 | 0.103 | 0.149 | |
| 26 | Fe(0.3) | 0.061 | | 1.372 | 0.163 | - | |
| 28 | CAM(200) | 455 | | 0 | 0 | - | |
| 32 | M-Coli(1) | | | 3 | 0 | - | |
| 32 | Fecal(1) | | | 3 | 0 | - | |
| 33 | Fe(0.3) + | 0.046 | | 0.718 | 0.123 | - | |
| | Mn(0.05) + | 0.025 | | 0.060 | 0.016 | - | |
| | M-Coli(1) | | | 10 | 0 | - | |
| | Fecal(1) | | | 3 | 0 | - | |
| 34 | Mn(0.05)+ | NYC | | 0.080 | 0.002 | - | |
| 35 | M-Coli(1) | | | >250 | 0 | - | |
| | Fecal(1) | | | >250 | 0 | - | |
| 37,38 | CAM(200) | 313 | | | | | |
| 41 | M-Pb(0.05)+ | NYC | | 0.070 | 0.014 | - | |
| 43 | Fe(0.3) | | | 0.952 | 0.042 | 0.202 | |
| 44 | Mn(0.05)+ | 0.071 | | 0.032 | 0.023 | 0 | |
| 46 | M-Coli(1) | - | | 5 | - | - | |
| | Mn(0.05) | - | | 0.555* | - | - | |
| 49 | M-Coli(1) | | | 14 | 0 | - | |
| 54 | M-Coli(1) | | | 25 | 0 | - | |

Finished Water - as delivered to distribution system, treated or untreated

| | |
|---|---|
| ( ) | Public Health Service, Drinking Water Standards |
| M | Mandatory Standard |
| ____ | Exceeds Standard |
| L | Lowest sample value |
| NH | Next highest sample value |
| * | Exceed New York State Health Department limit of 0.3 ppm for Manganese |
| + | Average of samples did not exceed standard |

| Code W- | Constituents | Finished Water 1 | Finished Water 2 | Distribution System 1 | Distribution System 2 | Distribution System 3 | Number of Samples |
|---|---|---|---|---|---|---|---|
| 57 | CAM(200) | 409 | | | | | |
| | Fe(0.3) + | 0.031 | | 0.434 | 0.032L | 0.167NH | 7 |
| | Mn(0.05)+ | 0.085 | | 0.066 | 0.061 | | 7 |
| | | | | | 0.025L | 0.030NH | |
| 59 | Mn(0.05) + | 0.103 | | 0.063 | 0.015L | 0.040NH | 7 |
| 60 | M-Fluor(2.4) + | NYC | | 2.60 | < 0.1 | < 0.1 | 5 |
| | | | | 0.111 | 0.76 | | |
| 62 | TDS(500) | 588.3 | | | | | Bottled Water Plant |
| 63 | Mn(0.05) + | NYC | | 0.070 | 0.008L | 0.036NH | |
| 70 | M-Coli(1) | 3 | | 0 | - | - | |
| 71 | Mn(0.05)+ | 0.531* | | 0.109 | 0.070 | 0.247 | 13 |
| | | | | 0.109 | 0.095 | 0.103 | |
| | | | | | 0.018L | 0.034NH | |
| 74 | Fe(0.3) | | | 1.840 | 1.972 | | |
| | Turb(5) | 10.20 | | | | | |

## COMMENTS ON WATER SUPPLY SYSTEMS LISTED IN TABLE 3-W

W-12 Cortlandt Water District

This municipal system serves 16,500 with water from the New York City system. One distribution sample had an iron content of 0.439 ppm while seven others varied between 0.015 and 0.143. This appeared to be a local condition.

W-13 Cortlandt Water District #1

This municipal system using water from a New York City aqueduct serves 185 customers. One distribution sample had 1.40 ppm of iron and 0.188 ppm of manganese.

W-14 Croton-On-Hudson Water Supply

This municipal system serves 8,000 from five wells. One well sample had a lead content of 0.497 ppm. The county engineer found a one foot length of lead pipe serving the sampling tap used at the well. Samples from this tap, after flushing and six other points resulted in concentrations less than 0.007 ppm. One distribution system sample had an iron content of 0.534 ppm, county records show this to be from the well sampled -- blending from the four other wells prevents high iron content in the system. A finished water sample had a manganese content in excess of both Public Health Service and New York State standards.

W-15 **Croton Falls Water District**

This is a municipal system serving 2,630 from a well. The Community Water Supply Study had one sample with a coliform count of 14. Resampling of the same location was not possible due to absence of homeowner; however, the county collected samples from three other houses within two hundred yards. The results like the second Community Water Supply Study sample met the Drinking Water Standards.

W-21 **Harrison Water District #1**

This municipal system uses water from a New York City aqueduct and two of its own wells for serving a population of 6,000. One Community Water Supply Study bacteriological sample had a count of 5, the other was 0; however, 22 samples, 11 taken in each of the succeeding two months, by the county health department, provides no counts in excess of standards.

W-26 **Lake Katonah Club**

A community system serving 340 from one well. One distribution system sample had an iron content of 1.372 ppm; however, both the finished water and another distribution system sample were well within the limit of 0.3.

W-28 **Larchmont Water District**

This municipal system serves 6,860 from its own surface supply and a New York City aqueduct. A carbon filter was installed as a complete treatment plant serving the surface supply. The Carbon-Chloroform Extract was 455 ppb.

W-32 **Mt. Kisco Water Supply**

This is a municipal system serving 7,000 from a well and a reservoir. The Community Water Supply Study showed one sample with three coliform and three fecal coliform. A second sample was 0 and 0. Five samples taken by the County Health Department, as a recheck, all showed coliform counts less than 2 and fecal as less than 1.

W-33 **New Castle Water Company**

This community system uses both ground water and surface water with treatment prior to delivery to its 800 customers. The Community Water Supply Study sampling showed distribution sample with coliform count of 10, a fecal count of 3 and an iron content of 0.718. Another sample had values of 0,0 and 0.123. Resampling by the County Health Department at the same location showed coliform as $<2$, fecal as $<1$ and iron as 0.14 ppm. Another sample also showed similar results. One distribution system sample had a manganese content above the Public Health Service standard, but within the New York State standard.

W-35 **North Castle Water District #1**

This municipal system serves 2,000 with water from a New York City aqueduct and one well. One of the distribution system samples taken during the Community Water Supply Study had both coliform and fecal coliform in excess of 250. The results of the second sample were both zero. The County Health Department resampled at the same custodian's sink in the school basement and from buildings on either side of the school. All MPN's were less than 2 and all fecal coliform were less than 1. The County is continuing its surveillance.

W-37
W-38 **New Rochelle Water Company**

This water system serves 168,000 with water from two New York City aqueducts and its own resources.

A carbon filter placed on the treated water after complete treatment had a CCE of 313 ppm. Company would like further investigation to determine cause.

W-41 **Pelham Village Water Department**

This municipal system serves 2,000 with New York City water purchased through the New Rochelle Water Company. One sample had a lead content of 0.07 ppm. The County Health Department resampled the same source plus five surrounding points. Only the original source had lead exceeding the standard. All others were below 0.017 ppm. The original sample was in a school with almost all new piping. Efforts are still being made to track down the source of this local condition.

W-43 Pleasantville Water Department

This is a municipal water system serving 7,000 with water from a New York City aqueduct and one well. The Community Water Supply Study sampling show iron content of 0.952, 0.042, 0.202 in three distribution system samples. The one high value appeared to be a local condition.

W-46 Salem Acres Associates

This is a community system serving 108 people from one well. During the Community Water Supply Study only one sample was taken. It had a manganese content of 0.555 ppm and a coliform count of 5; however, resampling by the County Health Department at the same location, plus one other sample, gave an MPN of less than 2.

W-49 Tarrytown Water Supply

This municipal system serving 12,000 uses two surface sources. Two distribution system samples had coliform counts of 14 and 0. System has an open distribution reservoir without post chlorination contrary to state regulations. County Health Department has taken action.

W-54 Usonia Homes

Sampling during the Community Water Supply Study of this community system serving 188 from one well resulted in a distribution sample with a coliform count of 25. Another sample from the distribution system was zero. The County Health Department resampled at the same house with the high count and two adjoining houses -- all three MPN's were less than 2.

W-57 **Westchester Joint Water Works**

This municipal system serving 60,000 uses water from a New York City aqueduct and two reservoirs. Complete treatment is provided for their own reservoirs. One distribution system sample had an iron content of 0.434; however, six others varied between 0.032 and 0.167 while the plant sample was 0.031. Thus the one high count appears to be due to a local condition. Also two other samples (0.061 and 0.066) did not meet the Public Health Service standard for manganese while five did. All samples were well within the New York State standard of 0.3 ppm. A carbon filter produced a CCE of 409 ppb on the finished water from a complete treatment plant.

W-59 **White Plains Municipal Water Supply**

Approximately 55,000 are served by this municipal system that draws its water from three wells, one reservoir, and one of the New York City aqueducts. One distribution system sample of drbrn had a manganese content of 0.063 ppm.

W-60 **Yorktown Water Storage and Distribution District #1**

This municipal system serving 28,000 gets its water from eight sources - six wells, one reservoir and a New York City aqueduct. Pumping problems have resulted in a fluctuation in fluoride content. The County Health Department is maintaining a record of this and seeking a solution. Public Health Service sampling verified this situation -- four samples varied from $<0.1$ to 0.76 while one was 2.60 ppm.

W-70 **Windmill Farms Water Works**

This community system serves 1,370 from one well. A finished water sample had a coliform count of 3, while a distribution system sample had a count of zero.

W-71 **Yonkers Water Supply**

This is one of the major municipal system in Westchester. It serves 215,000 with water obtained from a New York City aqueduct, a well and a reservoir. Six distribution system samples exceeded the Public Health Service standard for manganese (0.109, 0.070, 0.247, 0.109, 0.095, and 0.103) while seven others varied between 0.018 and 0.034. All samples were within the New York State standard of 0.3 ppm. One finished water sample (0.531) exceeded both standards.

W-74 **Mountain Lakes Camp**

The Mountain Lakes Camp is a county-operated summer camp for about 650 underprivileged boys. There are four wells and the piping is mainly above ground and is drained during the winter. The Community Water Supply Study samples showed excessive iron (1.840 and 1.972 ppm in distribution system samples) content when collected in July. County records indicate similar results, but in late July and August, the iron content drops to within Public Health Service limits. The installation of treatment or burying of pipes does not seem warranted when the supply is used almost entirely for drinking during the summer. Due to loss of wet chemistry sample a second sample had to be taken in September for this supply. The well had been shut down for almost a month when the second sample was taken. Insufficient flushing time resulted in a high turbidity.

The following four systems had manganese content in excess of the Public Health Service standard of 0.05 ppm, but met the New York State standard of 0.3 ppm.

W-6 Bedford Water Storage and Distribution District #1

(0.165 and 0.158)

W-17 Goldens Bridge Community Associates Water Supply

(0.92)

W-24 Irvington Water District

(0.066, 0.103 and 0.149)

W-34 New Castle Water District #1

(0.080)

W-44 Greenrock Corp.

(0.071)

W-63 Mt. Vernon Water Supply

(0.070)

WESTCHESTER COUNTY

## EXCERPT FROM CROSS-CONNECTION CONTROL REPORT

Terrance L. Campbell, PHS Engineer

Code
W-

37,38 New Rochelle Water Company, New Rochelle, New York

| | |
|---|---|
| Population Served | 168,000 |
| Number of establishments visited | 3 |
| Number of hazards observed-Total | 10 |
| Hospital | 8 |
| Sewage Treatment Plant | 2 |
| Metal Plating Plant | 0 |

This private water utility looks to local plumbers and plumbing inspectors for cross-connection control. Water company personnel are concerned only with larger customers having private wells because of the possible loss in revenue. The City of New Rochelle employs two full-time plumbing inspectors who are concerned primarily with new construction and alterations. The city had no program for continuous reinspection. Increased cooperation with inspection personnel and water authorities to formulate a program is required.

71 Yonkers Water Works, Yonkers, New York

| | |
|---|---|
| Population Served | 215,000 |
| Number of establishments visited | 3 |
| Number of hazards observed- Total | 15 |
| Hospital | 11 |
| Sewage Treatment Plant | 0 |
| Metal Plating Plant | 4 |

The water authorities initially contacted indicated that the only cross-connection control activities were those of two other city departments. The building inspection department employs one man and a plumber to check certain new connections. No reinspections are involved. The chief city plumbing inspector, who operates independently of water authorities, indicated a serious need for additional qualified inspectors for routine work, not to mention reinspection. The plumbing code was not adequate to promote a successful program.

The second department involved was primarily concerned with hazards associated with food sanitation. Very little emphasis, if any, was given to plumbing and specifically cross-connections.

The water authorities were amazed at the past failure of these two agencies as indicated by the numerous hazards and code violations observed during our inspections. They realize that a great deal more emphasis is necessary at their level.

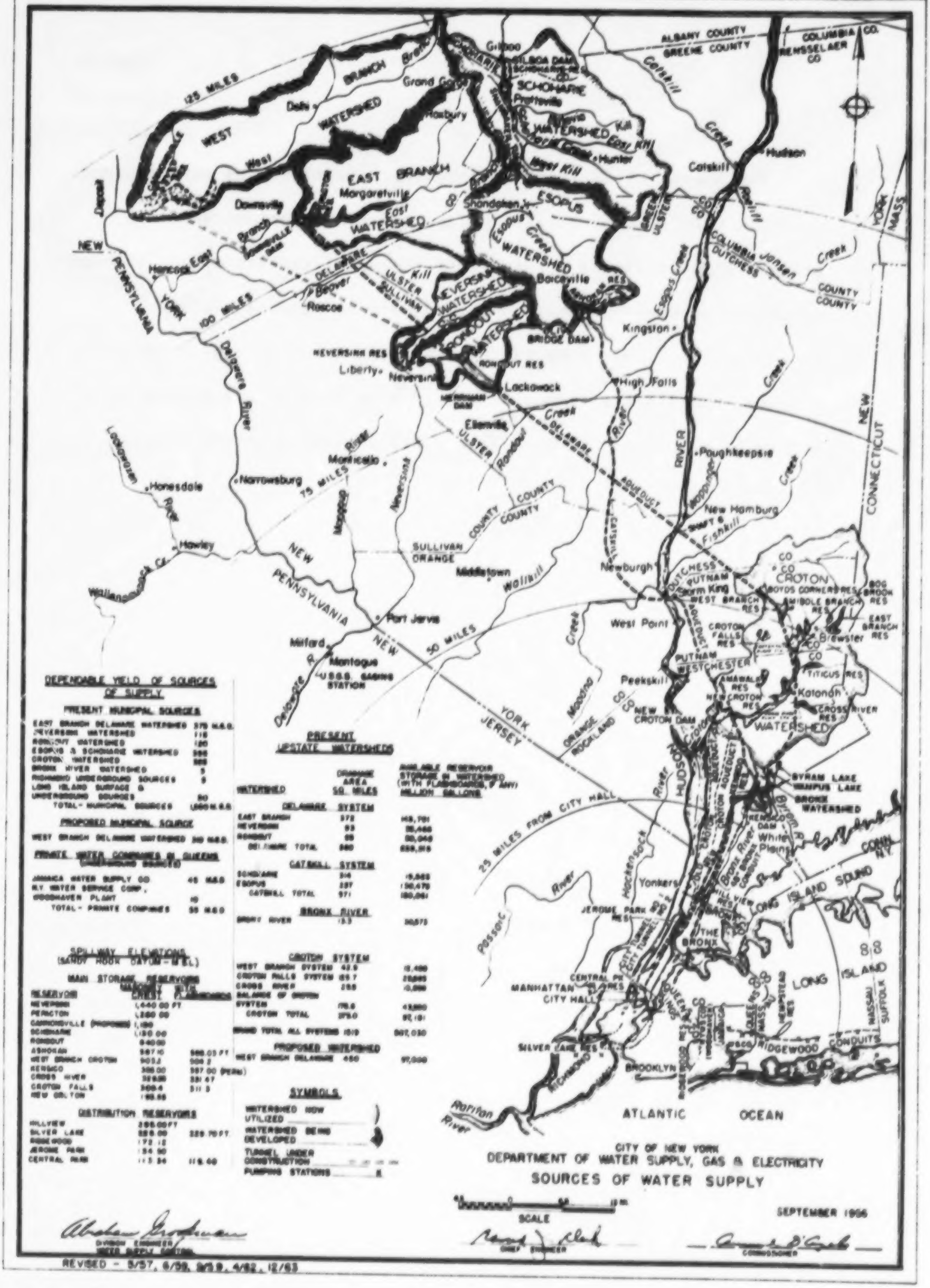
## NEW YORK CITY

In New York City responsibility for water supply is shared by three agencies, the Board of Water Supply, the Department of Water Resources in the Environmental Protection Administration, and the Bureau of Sanitary Engineering in the Department of Health.

The Board of Water Supply is responsible for the development of new sources of water supply. It designs and constructs new reservoirs, aqueducts, treatment facilities, et cetera. As each project is completed and when operation is satisfactory, the development is then turned over to the Department of Water Resources.

The Department of Water Resources is responsible for operating and maintaining the water supply system for the city, for furnishing a pure and wholesome water supply in sufficient quantity to meet all the needs of the city, for making and enforcing rules governing and restricting the use of water and for fixing charges for the supply of water, subject to the approval of the Board of Estimates. The following five pages provide an idea as to the magnitude of the New York City Water Supply System and the surveillance maintained for the sources and distribution system by the Department of Water Resources.

The Bureau of Sanitary Engineering also maintains surveillance over the City's water supply through a bacteriological sampling program which collects about 45% of the total samples taken, through an extensive cross-connection program and is responsible for investigation of all complaints pertaining to water supply  Bacteriological and fluoridation analysis is also done by the Bureau of Laboratories.  Over the past five years 100,000 fluoride analyses have been made.



ALBANY COUNTY
GREENE COUNTY
COLUMBIA CO.
RENSSELAER CO
125 MILES
100 MILES
75 MILES
50 MILES
25 MILES FROM CITY HALL
WEST BRANCH WATERSHED
EAST BRANCH WATERSHED
SCHOHARIE WATERSHED
ESOPUS WATERSHED
NEVERSINK WATERSHED
RONDOUT WATERSHED
CROTON WATERSHED
BRONX WATERSHED
Gilboa
GILBOA DAM
SCHOHARIE RES
Grand Gorge
Roxbury
Prattsville
Hunter
Margaretville
Downsville
DOWNSVILLE DAM
Shandaken
Boiceville
ASHOKAN RES
BRIDGE DAM
Kingston
Catskill
Hudson
Hancock
Deposit
Roscoe
NEVERSINK RES
RONDOUT RES
NEVERSINK DAM
Liberty
Neversink
Lackawack
Ellenville
High Falls
Poughkeepsie
New Hamburg
Newburgh
Middletown
Monticello
Narrowsburg
Honesdale
Hawley
Port Jervis
Milford
Montague
U.S.G.S. GAGING STATION
West Point
Peekskill
Storm King
Brewster
Katonah
White Plains
Yonkers
NEW CROTON DAM
WEST BRANCH RES
BOYDS CORNERS RES
MIDDLE BRANCH RES
BOG BROOK RES
EAST BRANCH RES
CROTON FALLS RES
TITICUS RES
AMAWALK RES
NEW CROTON RES
CROSS RIVER RES
KENSICO DAM
SYRAM LAKE
WAMPUS LAKE
JEROME PARK RES
CENTRAL PK RES
HILLVIEW
MANHATTAN
CITY HALL
THE BRONX
BROOKLYN
SILVER LAKE RES
RIDGEWOOD RES
RIDGEWOOD
CONDUITS
LONG ISLAND
LONG ISLAND SOUND
NASSAU
SUFFOLK
ATLANTIC OCEAN
DELAWARE AQUEDUCT
CATSKILL AQUEDUCT
NEW CROTON AQUEDUCT
Delaware River
Hudson River
Esopus Creek
Rondout Creek
Wallkill
Lackawaxen River
Wallenpaupack Cr.
Mongaup River
Neversink River
Moodna Creek
Hackensack River
Passaic River
Raritan River
Bronx R.
ULSTER
SULLIVAN
ORANGE
ROCKLAND
DUTCHESS
PUTNAM
WESTCHESTER
NEW YORK
PENNSYLVANIA
NEW JERSEY
CONNECTICUT
MASS.
CONN.
N.Y.

DEPENDABLE YIELD OF SOURCES OF SUPPLY

PRESENT MUNICIPAL SOURCES

| | |
|---|---|
| EAST BRANCH DELAWARE WATERSHED | 375 M.G.D. |
| NEVERSINK WATERSHED | 116 |
| RONDOUT WATERSHED | 120 |
| ESOPUS & SCHOHARIE WATERSHED | 555 |
| CROTON WATERSHED | 323 |
| BRONX RIVER WATERSHED | 5 |
| RICHMOND UNDERGROUND SOURCES | 5 |
| LONG ISLAND SURFACE & UNDERGROUND SOURCES | 30 |
| TOTAL - MUNICIPAL SOURCES | 1,530 M.G.D. |

PROPOSED MUNICIPAL SOURCE

| | |
|---|---|
| WEST BRANCH DELAWARE WATERSHED | 240 M.G.D. |

PRIVATE WATER COMPANIES IN QUEENS (UNDERGROUND SOURCES)

| | |
|---|---|
| JAMAICA WATER SUPPLY CO | 45 M.G.D. |
| N.Y. WATER SERVICE CORP. WOODHAVEN PLANT | 10 |
| TOTAL - PRIVATE COMPANIES | 55 M.G.D. |

PRESENT UPSTATE WATERSHEDS

| WATERSHED | DRAINAGE AREA SQ. MILES | AVAILABLE RESERVOIR STORAGE IN WATERSHED (WITH FLASHBOARDS, IF ANY) MILLION GALLONS |
|---|---|---|
| DELAWARE SYSTEM | | |
| EAST BRANCH | 372 | 148,701 |
| NEVERSINK | 93 | 35,466 |
| RONDOUT | 95 | 50,040 |
| DELAWARE TOTAL | 560 | 233,316 |
| CATSKILL SYSTEM | | |
| SCHOHARIE | 314 | 19,583 |
| ESOPUS | 257 | 130,478 |
| CATSKILL TOTAL | 571 | 150,061 |
| BRONX RIVER | | |
| BRONX RIVER | 13.3 | 30,573 |
| CROTON SYSTEM | | |
| WEST BRANCH SYSTEM | 42.9 | 12,490 |
| CROTON FALLS SYSTEM | 63.7 | 25,883 |
| CROSS RIVER | 29.5 | 10,350 |
| BALANCE OF CROTON SYSTEM | 176.6 | 48,880 |
| CROTON TOTAL | 375.0 | 97,181 |
| GRAND TOTAL ALL SYSTEMS | 1519 | 567,030 |
| PROPOSED WATERSHED | | |
| WEST BRANCH DELAWARE | 450 | 97,000 |

SPILLWAY ELEVATIONS (SANDY HOOK DATUM - M.S.L.)

MAIN STORAGE RESERVOIRS

| RESERVOIR | SPILLWAY CREST | WITH FLASHBOARDS |
|---|---|---|
| NEVERSINK | 1,440.00 FT | |
| PEPACTON | 1,280.00 | |
| CANNONSVILLE (PROPOSED) | 1,150 | |
| SCHOHARIE | 1,130.00 | |
| RONDOUT | 840.00 | |
| ASHOKAN | 587.10 | 590.03 FT |
| WEST BRANCH CROTON | 503.2 | 504.2 |
| KENSICO | 355.00 | 357.00 (PERM.) |
| CROSS RIVER | 329.50 | 331.67 |
| CROTON FALLS | 309.4 | 311.3 |
| NEW CROTON | 196.56 | |

DISTRIBUTION RESERVOIRS

| | | |
|---|---|---|
| HILLVIEW | 295.00 FT | |
| SILVER LAKE | 228.00 | 229.70 FT |
| RIDGEWOOD | 172.12 | |
| JEROME PARK | 134.50 | |
| CENTRAL PARK | 113.34 | 115.40 |

SYMBOLS

| | |
|---|---|
| WATERSHED NOW UTILIZED | ) |
| WATERSHED BEING DEVELOPED | ● |
| TUNNEL UNDER CONSTRUCTION | - - - - |
| PUMPING STATIONS | ▪ |

CITY OF NEW YORK
DEPARTMENT OF WATER SUPPLY, GAS & ELECTRICITY
SOURCES OF WATER SUPPLY

SCALE

SEPTEMBER 1956

DIVISION ENGINEER WATER SUPPLY CONTROL

CHIEF ENGINEER

COMMISSIONER

REVISED - 3/57, 6/59, 9/59, 4/62, 12/63

THE FOLLOWING TABLES SHOULD PROVIDE AN IDEA AS TO THE MAGNITUDE OF THE NEW YORK CITY WATER SUPPLY SYSTEM:

Employees

| | |
|---|---|
| Board of Water Supply | 591 |
| Department of Water Resources | 4,178 |
| Bureau of Sanitary Engineering | 30 |

| SOURCES | Watershed Area Square Miles | Dependable Yield MGD | Storage Reservoir | Reservoir Capacity-BG |
|---|---|---|---|---|
| West Branch-Delaware | 450 | 310 | Cannonsville | 95.7 |
| East Branch-Delaware | 371 | 375 | Pepacton | 143.7 |
| Neversink | 92 | 115 | Neversink | 35.5 |
| Roundout | 95 | 120 | Roundout | 50.1 |
| Schoharie | 314 | 215 | Schoharie | 19.6 |
| Esopos | 257 | 340 | Ashoken | 130.5 |
| Croton | 375 | 325 | Reservoirs-12<br>Lakes-6 | 98.0 |
| Bronx River | 13 | 5 | Kensico | 30.6 |
| Richmond | Wells | 5 | - | - |
| Long Island | Wells | 50 | - | - |
| TOTAL | 1,967 | 1,860 | | 603.7 |

| Tunnels/Aqueducts | From | To | Diameter | Length Miles | Capacity MGD |
|---|---|---|---|---|---|
| West Del. Tunnel | Cannonsville | Roundout | 11' - 4" | 44 | 500 |
| East Del. Tunnel | Pepacton | Roundout | 11' - 4" | 25 | 750 |
| Delaware Aqueduct | Roundout | Hillview | 13' to 19' | 88 | 890 |
| Catskill Aqueduct | Ashakan | Kensico | 14' to 18' | 92 | 600 |
| New Croton Aqueduct | Croton | 135 Street | 13' to 14' | 29 | 300 |
| City Tunnel No 1 | Hillview | Bronx, Manh, Kings | 11' to 15' | 18 | 600 |
| City Tunnel No 2 | Hillview | Bronx, Queens, Kings | 15' to 21' | 20 | 800 |
| City Tunnel No 3 | Being Constructed | | 20' to 24' | 50 | 1,800 |
| Shondaken Tunnel | Schoharie | Esopus Creek | 10' to 11' | 18 | 615 |
| Neversink Tunnel | | | 10' | 7 | 500 |
| Richmond Tunnel | Brooklyn | Staten Isl. | 10' | 5 | 80 |

| Distribution Reservoirs | Location | Capacity MGD |
|---|---|---|
| Hillview | Bronx | 929.0 |
| Jerome Park | Bronx | 773.4 |
| Central Park | Manhattan | 1,018.4 |
| Ridgewood | Queens | 208.1 |
| Silver Lake | Richmond | 286.0 |
| TOTAL | | 3,214.9 |

**Distribution System Piping**

| Size | Feet | Miles |
|---|---|---|
| 4" | 220,000 | 44 |
| 6" | 4,500,000 | 900 |
| 8" | 12,500,000 | 2,500 |
| 10" | 140,000 | 28 |
| 12" | 8,140,000 | 1,625 |
| 14" | 33,000 | 6 |
| 16" | 840,000 | 165 |
| 20" | 1,950,000 | 390 |
| 24" | 240,000 | 50 |
| 30" | 265,000 | 50 |
| 36" | 399,000 | 75 |
| 42" | 12,500 | 2 |
| 48" | 876,000 | 175 |
| 60" | 147,000 | 30 |
| 66" | 56,000 | 11 |
| 72" | 150,000 | 30 |
| 84" | 560 | -- |
| TOTAL | 30,468,560 | 6,081 |

**Pumping Stations**

| | | MGD |
|---|---|---|
| 1. | 40 Street | 20.0 |
| 2. | Riverdale | 0.1 |
| 3. | 179 Street | 20.0 |
| 4. | Douglaston | 5.0 |
| 5. | Richmond-Annadale | .6 |
| 6. | Richmond-Clove | 7.0 |
| | TOTAL | 52.7 |

**Standby**

| | |
|---|---|
| Jerome | 40.0 |
| Mosholu | 55.0 |
| Central Park | 50.0 |
| TOTAL | 145.0 |

## 1968 SURVEILLANCE PROGRAM

WATER QUALITY CONTROL DIVISION
DEPARTMENT OF WATER RESOURCES

| Laboratory | System Served | NUMBER OF SAMPLES COLLECTED 1968<br>Reservoir Quality | <br>Sewage Treatment Plants on Watersheds | <br>Stream* | <br>Misc | TOTAL NUMBER OF TEST 1968 | SANITARY** SURVEYS |
|---|---|---|---|---|---|---|---|
| Ben Nesin | Catskill | 2,968 | 1,729 | 1,892 | 141 | 56,982*** | 78 |
| Grahamsville | Delaware | 1,931 | 2,688 | 1,180 | 153 | 22,145*** | 51 |
| Kensico<br>Chelsea<br>Brewster | Croton<br>and<br>Kensico | 5,095 | 1,496 | 2,131 | 42 | 90,213*** | Continuous survey maintained |
| TOTAL | | 9,994 | 5,913 | 5,203 | 336 | 169,340 | |
| Mt. Prospect | Distribution | Number of Samples Collected | | | | | |
| | Priv Water Co's(2) | | 20,582**** | | | 185,238*** | |
| | L.I. Well | Sampling Stations | 190 | | | | |
| | S.I. Well | Sampling Points | 31 | | | | |

* Over 150 streams tributary to the New York City reservoirs are routinely sampled and analyzed while another 50 are sampled as needed

** Approximately 40 watershed inspectors under the supervision of sanitary engineers continually patrol the watersheds independently of the Water Quality Control Division's activities

*** See table next page as example of tests run by laboraties

**** This does not include samples taken by the New York City Health Department or the private water companies within the city

## RANGE & AVERAGE CHARACTERISTIC ANALYSES OF THE CATSKILL-DELAWARE AND CROTON SUPPLIES IN THE DISTRIBUTION SYSTEM YEAR 1968

| | CATSKILL-DELAWARE | | CROTON | |
|---|---|---|---|---|
| | RANGE | AVERAGE | RANGE | AVERAGE |
| Temperature °F | 36-68 | 50 | 34-64 | 49 |
| Turbidity (u) | 1- 9 | 3 | 1-20 | 5 |
| Color ( m/L ) | 3-12 | 6 | 2-30 | 11 |
| Taste & Odor | 0/0-1Ce/Ce | 0/0 | 0/0-IV/IV | 0/0 |
| Nitrogen (mg/L) | | | | |
| Free Ammonia | .006-.048 | .024 | .010-.072 | .029 |
| Albuminoid (Total) | .06-.25 | .10 | .08-.26 | .15 |
| Nitrite | .000-.002 | .002 | .001-.006 | .002 |
| Nitrate | .03.-.20 | .15 | .03-.40 | .25 |
| Oxygen Consumed (mg/L ) | 1.3-3.7 | 1.8 | 2.5-6.2 | 4.1 |
| Carbon Dioxide (mg/L ) | .8-6.0 | 4.0 | 4.5-5.4 | 5.0 |
| Dissolved Oxygen (mg/L ) | 10.6-17.9 | 14.0 | 9.0-10.2 | 10.1 |
| pH (Hydrogen ion conc.) | 6.4-7.5 | 7.2 | 7.0-7.9 | 7.3 |
| Bacteria per ml. | 1-8 | 5 | 2-2000 | 40 |
| Coliforms -% frequency portions /5 positive | .00-.30 | .08 | .00-.50 | .2 |
| Total Organisms (su/ml) | 35-575 | 155 | 15-2610 | 685 |
| Amorphous Matter (su/ml ) | 290-1200 | 660 | 300-1500 | 630 |
| Total Solids (mg/L ) | 32-51 | 44 | 115-149 | 127 |
| Fixed Solids (mg/L | 20-35 | 30 | 66-88 | 76 |
| Spec. Cond. (Mmhos) | 60-95 | 70 | 155-200 | 185 |
| LAS ( mg/L ) | .00-.06 | .01 | .00-.08 | .02 |
| Radiological Levels | | | | |
| Alpha pc/L | .02-.22 | .05 | .00-.38 | .13 |
| beta pc/L | 0.0-13.5 | 2.6 | 0.0-12.3 | 4.2 |
| Chloride ( mg/L ) | 3.5-9.0 | 5.3 | 12.8-21.0 | 16.3 |
| Alkalinity as $CaCO_3$ (mg/L) | 6-16 | 9 | 20-40 | 35 |
| Hardness as $CaCO_3$ " | 18-23 | 21 | 54-74 | 66 |
| Calcium as Ca " | 5.2-6.3 | 5.8 | 16.5-18.7 | 17.5 |
| Magnesium as Mg " | 1.4-1.5 | 1.4 | 6.4-6.8 | 6.5 |
| Silica as $SiO_2$ " | 1.0-1.5 | 1.3 | 2.0-5.0 | 3.5 |
| Sodium " | 2.5-3.7 | 3.0 | 5.5-7.8 | 6.4 |
| Carbonate " | .00-.00 | .00 | .00-.00 | .00 |
| Sulfate " | 5.0-11.0 | 7.8 | 11.5-24.5 | 15.0 |
| Phosphate " | .05-.18 | .13 | .03-.22 | .13 |
| Fluoride " | .10-1.10 | .86 | .05-1.05 | .79 |
| Lead " | .00-.00 | .00 | .00-.01 | .00 |
| Copper " | .02-.14* | .07 | .03-.83* | .35 |
| Aluminum " | .00-.05 | .02 | .00-.26 | .03 |
| Iron " | .02-.17 | .05 | .01-.58 | .12 |
| Manganese " | .00-.17 | .04 | .00-.35 | .09 |
| Arsenic " | .000-.002 | .001 | .000-.001 | .000 |
| Cyanide " | .000-.003 | .000 | .000-.013 | .005 |
| Cadmium " | .00-.00 | .00 | .00-.00 | .00 |
| Chromium $^{+6}$ " | .00-.00 | .00 | .00-.00 | .00 |
| Iodide " | .000-.003 | .002 | .000-.004 | .002 |
| Potassium " | .30-.95 | .52 | 0.8-3.2 | 1.6 |
| Phenol " | .000-.014 | .004 | .000-.001 | .000 |
| Selinium " | .003-.007 | .004 | .002-.008 | .005 |
| Silver " | .013-.027 | .020 | .013-.032 | .023 |
| Boron " | .000-.003 | .001 | .001-.005 | .003 |
| Zinc " | .01-.02 | .01 | .02-.09 | .04 |

* Maximum during Copper Sulfate treatment

## COMPARISON OF THE QUALITY OF HUDSON RIVER WATER AND NEW YORK CITY'S UPLAND SOURCES

| | PHS DWS | | Hudson River* Poughkeepsie(61)+ | | | Delaware-Catskill** 1968 | | | Croton** 1968 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Recom | Mand | Min | Max | Ave | Min | Max | Ave | Min | Max | Ave |
| Aluminum | - | - | .003 | .054 | .033 | .00 | .05 | .02 | .00 | .26 | .03 |
| Arsenic | .01 | .05 | Absent or below detection limit | | | .000 | .002 | .001 | .000 | .001 | .000 |
| Barium | - | 1.0 | .011 | .052 | .034 | Not measured | | | Not measured | | |
| Beryllium | - | - | Absent or below detection limit | | | Not measured | | | Not measured | | |
| Boron | - | - | .021 | .095 | .046 | .000 | .008 | .001 | .001 | .005 | .003 |
| Cadmium | - | .011 | Absent or below detection limit | | | Not measured | | | Not measured | | |
| Chromium | - | .05 | .002 | .033 | .011 | .00 | .00 | .00 | .00 | .00 | .00 |
| Cobalt | - | - | Absent or below detection limit | | | Not measured | | | Not measured | | |
| Copper | 1.0 | - | .005 | .072 | .019 | .02 | .14 | .07 | .03 | .83 | .35 |
| Iron* | .3 | - | .004 | .154 | .043 | .02 | .17 | .05 | .01 | .58 | .12 |
| Manganese | .05 | - | .0006 | .007 | .0033 | .00 | .17 | .04 | .00 | .35 | .09 |
| Nickel | - | - | Absent or below detection limit | | | Not measured | | | Not measured | | |
| Lead | - | .5 | .005 | .023 | .014 | .00 | .00 | .00 | .00 | .01 | .00 |
| Silver | - | .05 | Absent or below detection limit | | | .013 | .027 | .020 | .013 | .032 | .023 |
| Strontium | - | - | .063 | .155 | .099 | | | | | | |
| Vanadium | - | - | Absent or below detection limit | | | Not measured | | | Not measured | | |
| Zinc | 5.0 | - | .008 | .093 | .052 | .01 | .022 | .01 | .02 | .09 | .04 |
| Coliform/ 100ml | | | Not measured | | | 1 | 8 | 5 | 2 | 2000 | 40 |

Source

* Five year Summary of Trace Metals in Rivers and Lakes of the United States (October 1, 1962-September 30, 1967), etcetera

** New York City Department of Water Resources, Environmental Protection Agency. Actually 46 parameters were measured, but those listed above for comparison were the only ones measured in Five year Summary.

+ Miles above lower end of Manhattan (The Battery)

## COMPARISON OF THE QUALITY OF HUDSON RIVER WATER AND NEW YORK CITY'S UPLAND SOURCES (continued)

| | PHS DWS | | Delaware-Catskill* 1968 | | | Croton* 1968 | | | HUDSON RIVER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | *Cornwall(59)+ 1968 | | | *Chelsea(69)+ 1968 | | | Poughkeepsie*** (81)+ | | |
| | Recom | Mand | Min | Max | Ave | Min | Max | Ave | Min | Max | Ave | Min | Max | Ave | Min | Max | Ave |
| Turbidity | 5 | - | 1 | 9 | 3 | 1 | 20 | 5 | 4 | 40 | 14 | 3 | 14 | 15 | 7 | 45 | 40 |
| Color | 15 | - | 3 | 12 | 6 | 2 | 30 | 11 | 22 | 55 | 36 | 32 | 55 | 28 | 17 | 38 | 25 |
| Nitrates | 45 | - | .03 | .20 | .15 | .03 | .4 | .25 | .12 | .55 | .37 | .12 | .50 | .36 | - | - | - |
| Dissolved Oxygen | - | - | 10.6 | 17.9 | 14.0 | 9.0 | 10.2 | 10.1 | 5.5 | 12.9 | 9.0 | 5.9 | 13.3 | 8.8 | 6.6 | 14.5 | 9.0** |
| pH | - | - | 6.4 | 7.5 | 7.2 | 7.0 | 7.9 | 7.3 | 7.5 | 8.1 | 7.7 | 7.3 | 8.1 | 7.6 | 6.9 | 7.5 | 7.2 |
| Total Solids | 500 | - | 32 | 51 | 44 | 115 | 149 | 127 | 106 | 2518 | 381 | 104 | 761 | 198 | - | - | - |
| Chlorides | 250 | - | 3.5 | 9.0 | 5.3 | 12.8 | 21.0 | 16.3 | 8.2 | 1105 | 138.4 | 8 | 351 | 45.5 | 8 | 25 | 15 |
| Iron | 0.3 | - | .02 | .17 | .05 | .01 | .58 | .12 | .00 | 1.6 | .71 | .15 | 1.45 | .78 | | | |
| Manganese | .05 | - | .00 | .17 | .04 | .00 | .35 | .09 | .00 | .23 | .07 | .00 | .20 | .05 | | | |
| Aluminum | - | - | Not measured | | | Not measured | | | .03 | .08 | .06 | .01 | .10 | .06 | | | |
| Coliform/100ml | (10,000 raw water) | | 1 | 8 | 5 | 2 | 2000 | 40 | 930 | 2.4M | 183,409 | 20 | 24000 | 1900 | 60 | 70,000 | 2,400 |
| CCE | 200 | | | | | | | | | | | | | | | | |
| 1960-61 | (10 months) | | | | | | | | | | | | | | 38 | 97 | 64** |
| 1968-69 | (18 months) | | | | | | | | | | | | | | 131 | 282 | 202** |

+ Miles above lower end of Manhatten (The Battery)

Source
- * New York City Department of Water Resources
- ** FWPC, Department of Interior, National Water Quality Network
- *** Poughkeepsie Water Filtration Plant

CWSS-II
New York City

Total Population - 7,967,000

Population served by public water supply systems (Does not include estimated 800,000 daily transients from Connecticut, New Jersey and surrounding New York counties or population served by 30 supply systems in Westchester County using New York City water) - 7,965,000

Total number of supply systems - 3
(Municipally, publicly owned 1, privately owned 1)
Sources - Surface 3 systems Ground 110 wells plus
2 systems

Consumption - 1.413 MGD

Number of Bacteriological Samples required annually to meet PHS Standards - 10,860

Number of Bacteriological Samples required annually to meet New York State Standards - 9,300

Number of supply systems taking sufficient samples to meet PHS Standards - 2

Number of supply systems taking sufficient samples to meet New York State Standards - 3

Number of additional samples supply systems would to take to meet New York State Standards - 0

Number of supply systems for which samples were taken for which PHS and New York State Standards were met - 3

Population served by these supply systems - 7,965,000

| | No of Systems | Pop Served |
|---|---|---|
| Fluoridated | 1 | 7,290,000 |
| Operator holds State license | 3 | 7,965,000 |
| Operator license not required - no treatment | 0 | 0 |
| Unlicensed operator-violation of State Sanitary Code | 0 | 0 |
| Chlorinating | 3 | 7,965,000 |
| Chlorination not required- source wells only | 0 | 0 |
| Not chlorinating-violating State Sanitary Code | 0 | 0 |
| Supply systems served by a State Approved Laboratory | 3 | 7,965,000 |
| Supply systems having a chemical analysis | 3 | 7,965,000 |
| Supply systems having radiological analysis | 2 | 7,840,000 |
| Supply systems having a sanitary survey | 2 | 7,840,000 |
| Cross-Connection - code | 3 | 7,965,000 |
| Cross-Connection - active program | 3 | 7,965,000 |

KEY: For Table 2-NYC

Ownership

M - Municipal or community public water supply system publicly owned
C - Municipal or community public water supply system privately owned
S - Systems covering trailer and mobile home parks, camps, institutions, etc.

Sampling

Total number of samples collected for system during CWSS for all tests

Source of Water

S - Surface
G - Ground
A - New York City Aqueducts
O - Other System

MGD - Million gallons per day

Y - Yes
N - No
Rad - Radiological
Chem - Chemical

Cross-Connections

Code - Using local or state code
Prog - Active continuing program

Chlorination

Y - System chlorinating
NR - Not required
R - Required

Additional Treatment

C - Chemicals used
S - Sedimentation
F - Filtration
S - Softening
I - Iron and manganese removal

Complaints

(Most frequent as reported by water utility staff)
Oper - Complaints by operator
Cust - Complaints by customer
Mang - Complaints by management

Licensing

LNR - License not required
LR - License required
(Otherwise grade is indicated)

Annual Bacteriological Sampling, Frequency Meets Requirements - NYS, PHS

Annual Bacteriological Sampling Frequency Meets Requirements of New York State - Public Health Service

( ) * Summer

( ) ** Bottle Water Supply

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-NYC

| Code NYC- | Population Served | Ownership | Total Samples-CWSS | Source | | Average Day | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections | | Chlorination | Fluoridation | Additional Treatment | Complaints | | | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S | G | MGD | | | | | Code | Prog | | | | Oper | Cust | Mang | | NYS | PHS |
| 1 | 7,290,000 | M | 198 | 3* | 2** | 1,335.00 | Y | Y | Y | Y | Y | Y | Y | Y | C | N | T&O | Budget Man-power | *** | Y | Y |
| 2 | 550,000 | C | 69 | - | 96 | 68.20 | Y | Y | Y | Y | Y | Y | Y | N | C | N | Rust | N | *** | Y | Y |
| 3 | 125,000 | C | 34 | - | 14 | 9.9 | Y | Y | N | N | Y | Y | Y | N | C | Wages | Low Pressure, Chlorine | Revenue | *** | Y | |

* Upland Systems
** Well system - One on Staten Island; one in Nassau (Standby)
*** Supplies all under Professional Engineers and Licensed Operators

### LIST OF WATER SUPPLIES IN THE COMMUNITY WATER SUPPLY STUDY
New York City

| Code NYC- | Name of Water Supply | Location |
|---|---|---|
| 1 | Department of Water Resources | New York City |
| 2 | Jamaica Water Supply | Borough of Queens, New York City and Nassau County |
| 3 | Utilities and Industry Corp. (Woodhaven) | Borough of Queens, New York City |

## TABLE 3-NYC

### VALUES EXCEEDING DRINKING WATER STANDARDS
(Based on Community Water Supply Study Sampling Only)

| Code NYC- | Constituents | Finished Water | | Distribution System | | | | Number of Samples |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 1 | 2 | 3 | | |
| 1 | Mn(0.05)+ | 0.058 | | | | | | 8 |
| 1M | Mn(0.05)+ | | | 0.105 | 0.013L | 0.040NH | | 18 |
| 1Q | M-Pb(0.05)+ | - | | 0.104 | 0.007L | 0.052NH | | 14 |
| 1K | Fe(0.3) + | - | | 0.374 | 0.004L | 0.082NH | | 18 |
| 2 | Color(15)+ | 45.<br>< 5. | 8.<br><5. | | | | | 4 |
| 2 | Fe(0.3) + | 2.330<br>0.370 | 0.553 | 0.563 | 0.512 | 0.019L | 0.292NH | 26 |
| 2 | Mn(0.05) | 0.134<br>0.314 | 0.198 | 0.204<br>0.095 | 0.369*<br>0.003L | 0.060<br>0.049NH | | 26 |
| 2 | M-Pb(0.05)+ | .000<br>.000 | .000 | 0.138 | 0.000L | 0.023NH | | 26 |
| 2 | Cu(1.0) + | .067<br>.089 | .084 | 1.92 | 0.067L | 1.06NH | | 26 |
| 2 | CAM(200) | 217<br>113 | 88 | | | | | |
| 3 | Fe(0.3) + | 0.012<br>0.031 | 0.046 | 0.461 | 0.012L | 0.143NH | | 10 |
| 3 | Mn(0.05)+ | 0.122<br>0.010 | 0.002 | 0.067 | 0.002L | 0.043NH | | 10 |
| 3 | TDS(500) | 462.6<br>1691.0 | 508.0 | | | | | 3 |
| 3 | Chlorides (250) | 760.0<br>65.0 | 32.8 | | | | | 3 |
| 3 | Nitrates(45)+ | 48.7<br>38.6 | 44.3 | | | | | 3 |

Finished Water - as delivered to distribution system, treated or untreated

| | |
|---|---|
| ( ) | Public Health Service, Drinking Water Standards |
| M | Mandatory Standard |
| ____ | Exceeds Standard |
| L | Lowest sample value |
| NH | Next highest sample value |
| * | Exceed New York State Health Department limit of 0.3 ppm for Manganese |
| + | Average of samples did not exceed standard |

## COMMENTS ON WATER SUPPLY ITEMS LISTED IN TABLE 3-NYC

NYC-1 New York City

Approximately 7,290,000 are served by this municipal system from three upland surface systems. Two well supplies within the system are used only for emergencies. One of eight finish water samples had a manganese content in excess of the drinking water standards, but was within the New York State standard of 0.3 ppm. A total of 79 distribution system samples were collected for this supply. One of the 79 had an iron content of 0.374 ppm, while another had a manganese content of 0.105.

One of the 79 distribution system samples had lead content of 0.104 ppm. The Department of Water Resources rechecked this sampling point and found a lead service connection serving this building, a gasolene station.

NYC-2 Jamaica Water Company

This is a private water company in the Borough of Queens serving about 550,000 in New York City and 100,000 in Nassau County. Sources of supply are 96 wells located throughout the area served. Twenty-six distribution system samples were collected during the Community Water Supply Study. One sample had a lead content of 0.138 ppm and copper of 1.92 ppm. At the time of the original sampling the house was being renovated and the water had not been used for some time.

With the house now in use, resampling gave contents of 0.08 ppm for copper and 0.02 ppm for lead. The water supplied to this house was within the required standards. Localized conditions also resulted in two samples containing iron of 0.563 and 0.512 ppm, while the remaining 24 samples were all less than the standard, 0.3 ppm. Iron removal facilities are provided at some well sites. One of three carbon filters installed on three wells in Nassau County had a CCE of 217 ppb. The other two were 88 and 113 ppb.

NYC-3 Utilities and Industries Corp. (Woodhaven)

This private supply serves 150,000 consumers in the borough of Queens from 15 well sites. One finished water sample contained TDS of 1,691 ppm and 760 ppm of chlorides. Another finished water sample had TDS of 508 and 48.7 ppm of nitrates. One out of 10 iron samples exceeded the limit of 0.3 ppm. Its content of 0.461 ppm appeared to be a local problem since the other nine varied from 0.002 to 0.043. One finished water sample and one distribution system sample had manganese contents exceeding the Public Health Service limit, but not the New York State standard. The remaining 11 samples met both standards.

## NEW YORK CITY   EXCERPT FROM CROSS-CONNECTION CONTROL REPORT
Terrance L. Campbell, PHS Engineer

Code
NYC-

1   Department of Water Resources, New York City

| | |
|---|---|
| Population Served | 7,290,000 |
| Number of establishments visited | 3 |
| Number of hazards observed- Total | 14 |
| Hospital | 7 |
| Sewage Treatment Plant | 3 |
| Metal Plating Plant | 4 |

New York City water authorities were particularly interested in the cross-connection portion of the Community Water Supply Study. Their cross-connection control program was the result of efforts by several related health agencies with the New York City Health Department as the lead agency. They emphasize the need for cross-connection control and sponsor training for the benefit of the other agencies involved. Those establishments not under the jurisdiction of one of these agencies are then the responsibility of the Health Department. A special survey team then conducts cross-connection inspections and makes the necessary corrections. A survey of all mortuaries is a recent example.

An example of another agency preventing inter-connections and hazardous plumbing connections within the city supply in the New York State Health Department's annual survey of waste treatment facilities. Cross-connections are given special consideration during these surveys. This activity by the State has eliminated those hazards to the water system associated with waste treatment plants. The same is true of the Health Department's Bureau of Institutions' inspections of hospitals and nursing homes. During the course of our discussions, it was decided that use of the special surveys by the Health Department should be expanded and more comprehensive.

The actual protection required for any given hazard was at the hazard as opposed to isolation of the hazard within the building. This is desirable for protection of all persons within the facility as well as the city water supply. The best example of this was a large hospital which maintained its own cross-connection control program as a result of health department inspections. This is a continuous program including maintenance check and reinspections.

2 Jamaica Water Supply, Borough of Queens, New York City

| | |
|---|---|
| Population Served | 550,000 |
| Number of establishments visited | 1 |
| Number of hazards observed- Total | 1 |
| Hospital | 1 |
| Sewage Treatment Plant | - |
| Metal Plating Plant | - |

This private water company took the position that as a purveyor, their responsibility ended at the property line. As a result, no continuous program exists for the detection and elimination of plumbing hazards and cross-connections. Such a program should be established within the water company or the responsibility should be given to the health department having jurisdiction.

3 Utilities and Industry Corporation (Woodhaven), New York City

| | |
|---|---|
| Population Served | 125,000 |
| Number of establishments visited | 1 |
| Number of hazards observed- Total | 8 |
| Hospital | - |
| Sewage Treatment Plant | - |
| Metal Plating Plant | 8 |

This supply is a private water company within the bounds of New York City. They have very limited resources and no program regarding cross-connection control. The activities at hospitals and nursing homes, etcetera is the result of other agencies. An establishment practicing metal plating within this service area was particularly hazardous. Much more emphasis by water authorities is required.

---

* Cross-Connection Survey and Codes are applied by the New York City Health Department and Department of Buildings

The City of New York
**DEPARTMENT OF HEALTH**
125 WORTH ST. NEW YORK, N.Y. 10013
Telephone 566— 6016
BUREAU OF SANITARY ENGINEERING
93 Worth Street, N. Y. 13
Room 709

November 21, 1969

Mr. Everett L. MacLeman
Water Hygiene Representative
Bureau of Water Hygiene
United States Public Health Service
Federal Building - Room 837H
New York, N.Y. 10007

Dear Mr. MacLeman:

Reference is made to the meeting of September 29, 1969 in my office with you, Mr. Terence Campbell of the United States Public Health Service; the representatives of the New York State Department of Health, Messrs. Miles and Newman; and the Department of Water Resources, Mr. John Egan. This meeting, as you recall, was scheduled in order to discuss cross-connection problems in New York City in occasion of your Bureau's Community Water Supply Study (S.M.S.A.).

As I promised you during that meeting, some data are herewith transmitted regarding the City's programs on cross-connection surveys.

Report prepared by Mr. George Schaible dated November 7, 1969 on this subject is attached with all the basic documents containing descriptions of the cross-connection control program and the related legal basis for this Department's enforcement.

In addition to this information, I would like to underline the fact that the inspectors assigned to our program are either civil engineers or public health sanitarians under the direction of professional engineers or senior public health sanitarians. All the public health sanitarians assigned to this division have received additional training in health programs related to plumbing, training courses routinely given by our Office of Professional Education to public health sanitarians trainees or sanitarians assigned to special programs. For example, sanitarians of the Bureau of Sanitary Inspections of this Department assigned to the hospital units are routinely scheduled to obtain this training, since part of their activities also fall in the field of cross-connections. Some activities in this field are also performed by public health sanitarians who are assigned to inspection of general nuisances, inspection of food establishments, throughout the Environmental Health Services of this Department.

While the overall coordination of the cross-connection surveys is part of the responsibilities of this Department, there are some activities performed in this field by the Department of Buildings. A plumbing division with approximately 80 inspectors is responsible for plumbing code enforcement. These inspectors also receive training in this field in the Buildings Department beside qualifications required for the job which are at least 5 years of experience as a plumber journeyman. Their inspections are in connection with new constructions, alterations, or specific building problems and they are carried on to enforce the Building Code which also forbids cross-connections between City water supply and possible sources of pollution.

There is another cross-connection control program carried on by the Bureau of Water Register in the Department of Water Resources. This inspectorial staff of 134 men is providing services which involve not only meter readings but also investigation of leakages and general compliance with the rules and regulations of that department as far as water consumption in buildings, including plumbing hazards investigations.

There is another City agency which provides consulting services in this field and this is the Board of Standards and Appeals whose engineering office evaluates all the applications for approval of devices connected to the water supply in buildings. Prior to approval of such devices, the Board consults with the Department of Health on matters related to public health and uses the laboratory facilities of the Department of Water Resources for testing.

This report, and my previous report of September 24, 1969 complete the Health Department's assistance on your survey.

I would like to receive a copy of the analyses (bacteriological, chemical, etc.) performed in occasion of this survey by your bureau and, also, a copy of the final report for the evaluation of the water supply system.

Yours very truly,

John De Zuane
Acting Director
Bureau of Sanitary Engineering

JDeZ:gf
atts.

THE CITY OF NEW YORK
DEPARTMENT OF HEALTH
BUREAU OF SANITARY ENGINEERING
93 Worth Street, N.Y. 10013
Room 709

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NEW YORK, N. Y. 10013

TEL. 566-

## DIVISION OF WATER CONTROL

## CROSS CONNECTION ACTIVITIES

The Division of Water Control does cross-connection work in the following fields:

1. Meat and Poultry Plants - Inspections are made at the request of the United States and New York State Departments of Agriculture for the issuance of Potability Certificates. Inspection is made to determine if water supply and sewage disposal facilities are satisfactory and to insure that there are no interconnections between the city water supply and any potential source of contamination.

Applicable Health Code sections are 135.09 and possibly 141.03 and/or 141.09. Approximately 300 inspections are made each year.

2. Vessel and Railroad Watering Points - Inspections of interstate watering points are made at the request of the U.S. Public Health Service and follow the guidelines established by that agency. Non interstate vessel watering points are inspected in accordance with requirements of Section 141.11 of the Health Code. The primary concern on all inspections is to insure that there is no interconnection between the city water supply and harbor water or any other source of contamination. Approximately 50 inspections are made each year.

3. Wells

a) Potable - Routine inspections are made monthly to insure that the well water supply is of satisfactory quality and that no plumbing changes were made that would adversely affect either the well water supply or the city supply. No interconnections are permitted between the city water supply and the well supply.

Applicable Health Code sections are 141.09 and 135.09. There are 6 potable well installations in the city at the present time.

b) Non - Potable - An inspection is made of the initial installation to insure that there are no interconnections between the well water and the city water supply. Surveys of existing wells are made periodically.

Applicable Health Code section is 141.09. There are approximately 3,000 non - potable wells presently under permit with the Health Department.

4. Swimming Pools - Existing pools are routinely inspected. Part of this inspection includes a check to insure that there are no submerged i

or cross-connections between city water and the pool water system, and also that the pool waste water line is not connected to the street sewer in such a way as to allow a possible back-up of sewage into the pool water.

Engineering drawings of new pools must be approved by this office before construction begins. Field construction is also approved by this office. In this way cross-connections are removed from the initial design of the pool.

Applicable Health Code section is 165.13. There are approximately 450 existing indoor and outdoor pools in the city. 50-75 new pools are constructed each year.

5. Fire Sprinkler Systems - When and anti-freeze solution is used in an unheated area of a fire sprinkler system approval must be obtained from this office for both the anti-freeze solution and the methods to be used to protect the city water supply against back-up of the anti-freeze into the distribution system.

Applicable Health Code section is 135.09. There are approximately 200 fire sprinkler system in the city which have a portion of the system filled with an anti-freeze solution. 10-15 new applications are received each year.

6. Devices for chemically treating the drinking water supply for anti-corrosion purposes - There are approximately 4,000 installations in the City. The device, the installation and chemicals that can be used are all regulated by section 141.07 of Health Code. Surveys are made periodically of existing installations to ensure that no equipment changes have been made that would adversely affect the water supply.

7. Citizen's Complaints - The division investigates all complaints concerning the quality of the water supply. When required a cross-connection survey of the entire building is made. The roof tank may also be investigated. Approximately 400 complaints are investigated each year.

Applicable Health Code section are 141.02 and 141.03

8. Special Surveys - Periodically the division engages in an extensive cross-connection investigations of a particular industry or type of equipment which uses water, and where experience has shown cross-connections are prevalent.

Some of the areas of interest are:

1) Roof tanks
2) Refrigeration and air conditioning units
3) Waterfront industries
4) Plating industries

Personnel - There are 10 field inspectors assigned to the division and all contribute to the cross-connection activities of the division. Two field men and two supervisory personnel are assigned full time to the cross-connection section and they handle the bulk of the survey activities.

Nassau

In Nassau County the main responsibility for water supplies lies in the Bureau of Water Resources, in the Division of Environmental Health of the Department of Health. Some support is provided by other Bureaus such as the Bureau of General Engineering, which reviews plans and specifications and handles complaints.

The fine programs carried on by the Department of Health was very evident during the CWSS, in contacts with the water companies and from the results of the sampling of the supplies.

A good part of this successful effort is attributed to the support provided by the County Laboratory. In addition to support provided to many other health department programs the laboratory annually runs bacteriological tests on over 7,500 routine water supply samples and about 1,000 special samples. Standard chemical analysis of 20 items listed in the drinking water standards are run on over 1,000 samples. Special or partial testing is done on about 1,500 samples.

The Bureau of Water Resources also prepares for general publication reports on items of special interest to the area. Examples of these with a short description are presented below. Annually the Bureau also prepares one or two in house special studies on water supply problems. These are mainly for assistance to the local purveyors.

SURVEYS AND STUDIES AVAILABLE AT THE NASSAU COUNTY DEPARTMENT OF HEALTH

1) Report On Untreated Water Quality for Public Water Supply Wells in Nassau County -

   Contains information regarding the raw water quality being supplied by all water districts in Nassau County

2) Long Island Ground Water Pollution Study -

   Contains information on the movement of pollutants from cesspools to the ground water

3) Occurrences and Treatment of Iron on Long Island -

   Contains a summary of the iron problem that many water suppliers face and the methods used by suppliers to cope with the problems

4) Iron Filtration Plant Study -

   Contains detailed summary of all of the iron filter plants in operation in Nassau County

5) Nitrate Pollution of Groundwater -

   Contains a summary of nitrate epidemiology and sources of nitrate; defines the problem in Nassau County with some predictions for the future, and offers solutions

EUGENE H NICKERSON
COUNTY EXECUTIVE

COUNTY OF NASSAU
240 OLD COUNTRY ROAD
MINEOLA, NEW YORK 11501
DEPARTMENT OF HEALTH

BOARD OF HEALTH
LEO T FLOOD M D
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ROBERT P JESSUP M D
MRS SADIE BARRIS
THOMAS J PORTELA

JOS H KINNAMAN M D M P H
COMMISSIONER

July 7, 1969

Dear Sir:

The Nassau County Department of Health, in cooperation with the United States Public Health Service and the New York State Health Department, is planning a special survey of all domestic water systems in Rockland, Westchester, Nassau, and Suffolk Counties and the five boroughs of New York City. The survey will begin on 7/21/69. This study is a portion of a nationwide survey being carried out in nine areas throughout the United States, one in each U.S. Public Health Service Region.

The purpose of this study is to determine if the water being served in domestic systems meets the Public Health Service's Drinking Water Standards. The Public Health Service will not only review the bacteriological and chemical history of the water supplies surveyed, but will also collect samples for their own analysis. In addition, a sanitary survey will be made of the water system, facilities, and operation.

Your office will be contacted in the near future by the Public Health Service, and an appointment made for the survey at a mutually agreeable time.

Your cooperation in this study will be sincerely appreciated.

Very truly yours,

Sheldon O. Smith, M.C.E.,P.E.
Director, Bureau of Water Resources

SOS:bc

SUMMARY: Based on systems studied

Total Population - 1,530,629

Population served by public water supply systems - 1,419,789
(Includes transient school population of 16,000, but not 123,840 served in Nassau by Jamaica Water Co. of New York City)

Population not served by public water supply systems - 3,000

Total number of supply systems - 45
(Municipally, publicly owned 37, privately owned 5, Institutional 3)

Sources - Ground 474

Consumption - Average Day 147.775 MGD for 42 supply systems reporting

Number of supply systems serving 1,000 or less - 6

Number of Bacteriological Samples required annually to meet PHS Standards - 19,460

Number of Bacteriological Samples required annually to meet New York State Standards - 9,401

Number of supply systems taking sufficient samples to meet PHS Standards - 10

Number of supply systems taking sufficient samples to meet New York State Standards - 33

Number of additional samples supply systems would have to take to meet New York State Standards - 597

| | No of Systems | Pop Served |
|---|---|---|
| Fluoridated | 2 | 59,242 |
| Not Fluoridated | 43 | 1,360,547 |
| Operator holds State license | 39 | 1,405,819 |
| Operator license not required - no treatment | 5 | 8,170 |
| Unlicensed operator-violation of State Sanitary Code | 1 | 5,800 |
| Chlorinating | 15 | 837,960 |
| Chlorinating not required - source wells only | 30 | 581,829 |
| Not chlorinating-violating State Sanitary Code | 0 | 0 |
| Supply systems served by a State Approved Laboratory | 45 | 1,419,789 |
| Supply systems having a chemical analysis | 43 | 1,419,519 |
| Supply systems having a radiological analysis | 3 | 79,000 |
| Supply systems having a sanitary survey | 45 | 1,419,729 |
| Cross-Connection - code | 39 | 1,284,619 |
| Cross-Connection - active program | 10 | 310,225 |

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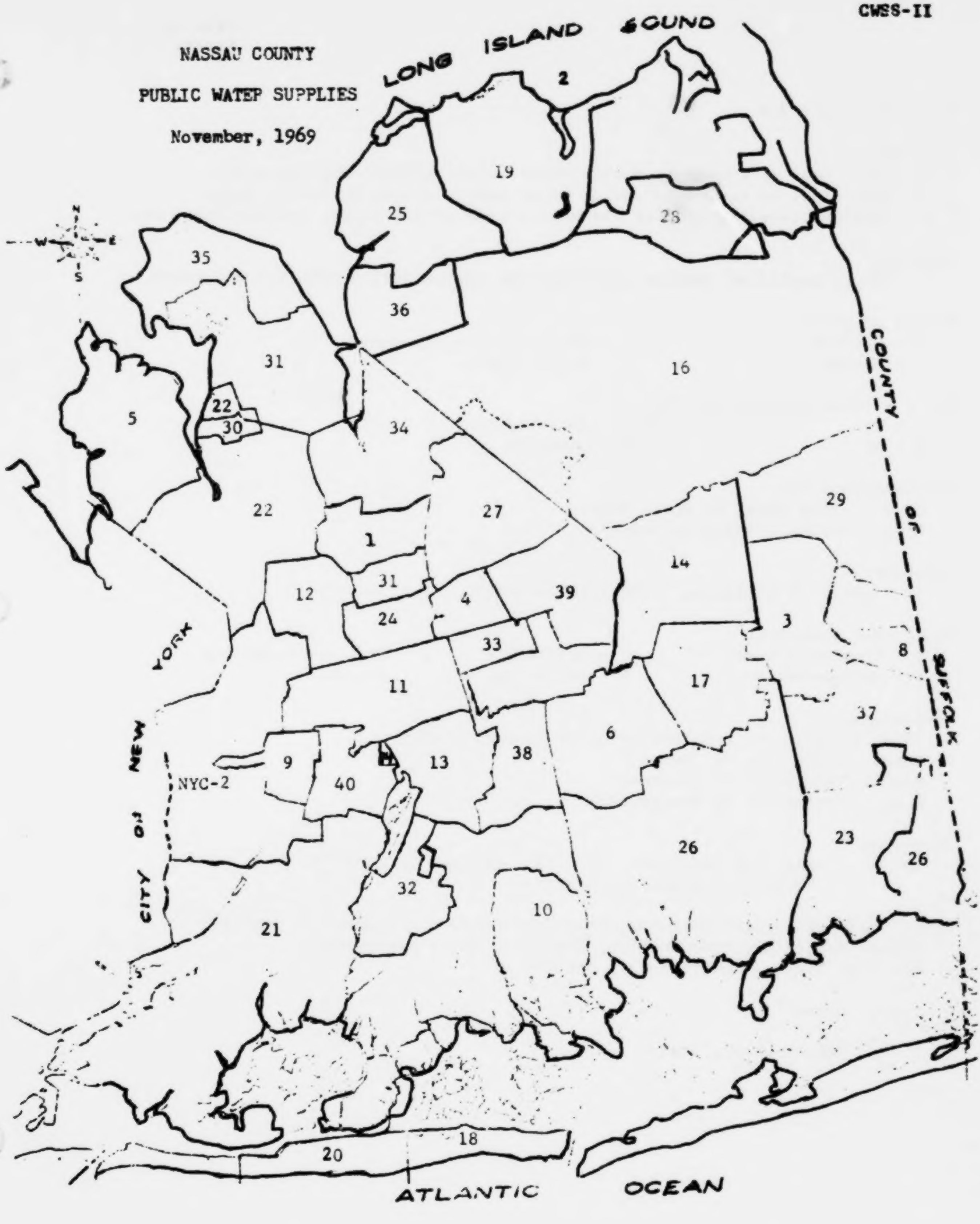
## LISTING OF WATER SUPPLIES IN THE COMMUNITY WATER SUPPLY STUDY

## NASSAU COUNTY

| Code N- | Name of Water Supply | Location |
|---|---|---|
| 1 | Albertson Water Dist | Roslyn Heights, N.Y. |
| 2 | Incorporated Village of Bayville Water Dept | Bayville, N.Y. |
| 3 | Bethpage Water Dist | Bethpage, N.Y. |
| 4 | Carle Place Water Dist | North Hempstead, N.Y. |
| 5 | Citizens Water Supply Co of Newstown | Great Neck, N.Y. |
| 6 | East Meadow Water Dist | East Meadow, N.Y. |
| 7 | Mitchell Field | Mineola, N.Y. |
| 8 | Farmingdale Water Dist | Farmingdale, N.Y. |
| 9 | Franklin Square Water Dist | Franklin Square, N.Y. |
| 10 | Village of Freeport Water Dept | Freeport, N.Y. |
| 11 | Incorporated Village of Garden City Water Dept | Garden City, N.Y. |
| 12 | Garden City Park Water Dept | Garden City Park, N.Y. |
| 13 | Hempstead Municipal | Hempstead, N.Y. |
| 14 | Hicksville Water Dist | Hicksville, N.Y. |
| 16 | Jericho Water Dist | Syosset, N.Y. |
| 17 | Levittown Water Dist | Levittown, N.Y. |
| 18 | Lido Point Lookout Water Dist | Point Lookout, N.Y. |
| 19 | Locust Valley Water Dist | Locust Valley, N.Y. |
| 20 | City of Long Beach Water Dept | Long Beach, N.Y. |
| 21 | Long Island Water Corp | Lynbrook, N.Y. |
| 22 | Manhasset-Lakeville Water Dept | Manhasset, N.Y. |
| 23 | Massapequa Water Dist | Massapequa, N.Y. |
| 24 | Mineola Water Dept | Mineola Village, N.Y. |
| 25 | Glen Cove Water Dept | Glen Cove, N.Y. |
| 26 | New York Water Service | Merrick, N.Y. |
| 27 | Old Westbury Water Dept | Old Westbury Village, N.Y. |
| 28 | Oyster Bay Water Dist | Oyster Bay, N.Y. |
| 29 | Plainview Water Dist | Plainview, N.Y. |
| 30 | Plandome Water Works | Plandome, N.Y. |
| 31 | Port Washington Water Dist | Port Washington, N.Y. |
| 32 | Rockville Centre Dept Water Supply | Rockville, N.Y. |
| 33 | Roosevelt Field Water Dist | Westbury, N.Y. |
| 34 | Roslyn Water Dist | Roslyn, N.Y. |
| 35 | Sands Point | Sands Point, N.Y. |
| 36 | Sea Cliff Water Co | Seacliff, N.Y. |
| 37 | South Farmingdale Water Dist | South Farmingdale, N.Y. |

| Code N- | Name of Water Supply | Location |
|---|---|---|
| 38 | Uniondale Water Dist | Uniondale, N.Y. |
| 39 | Westbury Water Dist | Westbury, N.Y. |
| 40 | West Hempstead-Hempstead Gardens Water Dist | West Hempstead, N.Y. |
| 41 | Williston Park Water Dept | Village of Williston, N.Y. |
| 42 | State University of New York | Oyster Bay, N.Y. |
| 43 | Sagamore Hill-National Park | Oyster Bay, N.Y. |
| 44 | Sel-Bra Acres Assoc-Cove Neck | Oyster Bay Cove, N.Y. |
| 45 | Mill Neck Estates | Mill Neck, N.Y. |
| 47 | Community Hospital at Glen Cove | Glen Cove, N.Y. |

# NASSAU COUNTY
# PUBLIC WATER SUPPLIES
November, 1969


LONG ISLAND SOUND
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CITY OF NEW YORK
COUNTY OF SUFFOLK
ATLANTIC OCEAN

KEY: For Table 2-N

Ownership

M - Municipal or community public water supply system publicly owned
C - Municipal or community public water supply system privately owned
S - Systems covering trailer and mobile home parks, camps, institutions, etc.

Sampling

Total number of samples collected for system during CWSS for all tests

Source of Water

S - Surface A - New York City Aqueducts
G - Ground O - Other System

MGD - Million gallons per day

Y - Yes Rad - Radiological
N - No Chem - Chemical

Cross-Connections

Code - Using local or state code
Prog - Active continuing program

Chlorination

Y - System chlorinating NR - Not required R - Required

Additional Treatment

C - Chemicals used F - Filtration I - Iron and manganese removal
S - Sedimentation S - Softening

Complaints

(Most frequent as reported by water utility staff)
Oper - Complaints by operator
Cust - Complaints by customer
Mang - Complaints by management

Licensing

LNR - License not required LR - License required
(Otherwise grade is indicated)

Annual Bacteriological Sampling, Frequency Meets Requirements - NYS, PHS

Annual Bacteriological Sampling Frequency Meets Requirements of New York State - Public Health Service

( ) * Summer

( ) ** Bottle Water Supply

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-N

| Code N- | Population Served | Ownership | Total Samples-CWSS | Source |  |  |  | Average Day | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections |  | Chlorination ** | Fluoridation | Additional Treatment | Complaints |  |  | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  | S | G | A | O | MGD |  |  |  |  | Code | Prog |  |  |  | Oper | Cust | Mang |  | NYS | PHS |
| 1 | 13,100 | M | 11 |  | 4 |  |  | 1.700 | Y | Y | N | Y | Y | N | NR | N | C | N | Cost | N | IIB | Y |  |
| 2 | 5,800 | M | 12 |  | 2 |  |  | 0.800 | Y | Y | N | Y | Y | N | NR | N | C | N | N | N | LR | Y |  |
| 3 | 32,000 | M | 11 |  | 7 |  |  | 2.660 | Y | Y | N | Y | Y | N | NR | N | C | Pay | Chlor | Profit | IIB | Y |  |
| 4 | 10,842 | M | 12 |  | 4 |  |  | 1.160 | Y | Y | N | Y | Y | N | NR | Y | C | N | N | Mon Controls on Supt | IIB | Y | Y |
| 5 | 31,000 | C | 12 |  | 10 |  |  | 4.040 | Y | Y | N | Y | Y | Y | NR | N | C | N | N | N | IIB | Y |  |
| 6 | 52,000 | M | 20 |  | 11 |  |  | 4.300 | Y | Y | N | Y | Y | N | Y | N | C | N | N | N | IIB |  |  |
| 7 | 18,000* | M | 11 |  | 5 |  |  | 0.166 | Y | Y | N | Y | Y | N | Y | N | C | N | N | N | IIB |  |  |
| 8 | 8,000 | M | 11 |  | 3 |  |  | 0.866 | Y | Y | N | Y | Y | Y | NR | N | C | N | N | N | IIB |  |  |
| 9 | 20,000 | M | 9 |  | 4 |  |  | 1.500 | Y | Y | Y | Y | Y | Y | NR | N | C | N | Meter Leaks | Hiring Qualified Person | IIB | Y |  |
| 10 | 41,000 | M | 12 |  | 8 |  |  | 4.350 | Y | Y | N | Y | Y | N | NR | N | C | Salary | N | N | IIB | Y |  |
| 11 | 24,000 | M | 18 |  | 9 |  |  | 4.000 | Y | Y | Y | Y | Y | N | NR | N | C | N | N | N | IIB | Y |  |
| 12 | 24,000 | M | 14 |  | 8 |  |  | 3.080 | Y | Y | N | Y | Y | N | NR | N | N | Tele-Com-Problems | Cost | N | IIB |  |  |

* 16,000 Transients  ** All supplies in Nassau County have standby chlorination facilities

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-N

| Code N- | Population Served | Ownership | Total Samples-CWSS | Source S | Source G | Source A | Source O | Average Day MGD | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections Code | Cross-Connections Prog | Chlorination | Fluoridation | Additional Treatment | Complaints Oper | Complaints Cust | Complaints Mang | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements NYS | Annual Bact Sampling Frequency Meets Requirements PHS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | 40,000 | M | 15 | | 9 | | | 4.680 | Y | Y | N | Y | Y | Y | Y | N | SC | Work-load | Chlor | Qual. Person | IIA | Y | |
| 14 | 59,800 | M | 16 | | 15 | | | 6.720 | Y | Y | N | Y | Y | Y | NR | N | C | N | Cost | N | IIA | Y | |
| 16 | 60,000 | M | 24 | | 19 | | | 8.700 | Y | Y | N | Y | Y | N | NR | N | N | N | Cost<br>Rust | N | IIB | | |
| 17 | 55,000 | M | 22 | | 15 | | | 5.060 | Y | Y | N | Y | Y | N | Y | Y | C | - | - | - | IIB | Y | Y |
| 18 | 6,500 | M | 9 | | 2 | | | 0.875 | Y | Y | N | Y | Y | N | Y | N | C | - | - | - | IIB | | |
| 19 | 7,000 | M | 8 | | 6 | | | 1.180 | Y | Y | N | Y | Y | N | NR | N | N | N | N | N | LNR | Y | |
| 20 | 35,000 | M | 13 | | 8 | | | 5.600 | Y | Y | Y | Y | N | N | Y | N | CF | Fe<br>Lack | Rust<br>Meters | Finan<br>Support | IB | | |
| 21 | 261,000 | C | 45 | | 159 | | | 23.700 | Y | Y | N | Y | Y | N | Y | N | CS | N | Color | N | IA | Y | Y |
| 22 | 42,700 | M | 16 | | 13 | | | 6.621 | Y | Y | N | Y | Y | Y | Y | N | FIC | N | N | N | II | | |
| 23 | 52,700 | M | 16 | | 8 | | | 3.900 | Y | Y | N | Y | Y | N | Y | N | C | Pay | Cost | Lack of Personnel | I | Y | |
| 24 | 22,052 | M | 14 | | 6 | | | 3.500 | Y | Y | N | Y | Y | N | NR | N | N | Pay | Cu | N | II | Y | |
| 25 | 27,000 | M | 15 | | 7 | | | 3.510 | Y | Y | N | Y | Y | N | NR | N | C | N | Cost | N | IIB | Y | |

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-N

| Code N- | Population Served | Ownership | Total Samples-CWSS | Source | | | | Average Day | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections | | Chlorination | Fluoridation | Additional Treatment | Complaints | | | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S | G | A | O | MGD | | | | | Code | Prog | | | | Oper | Cust | Mang | | NYS | PHS |
| 26 | 165,000 | C | 41 | | 17 | | | 11.530 | Y | Y | N | Y | Y | N | Y | N | C | N | Cost | In-come | IB | Y | Y |
| 27 | 2,500 | M | 12 | | 4 | | | 0.827 | Y | Y | N | Y | Y | N | NR | N | N | N | Cost | N | II | Y | |
| 28 | 9,025 | M | 9 | | 7 | | | 0.700 | Y | Y | N | Y | Y | Y | NR | N | C | N | N | N | III | Y | Y |
| 29 | 40,000 | M | 15 | | 10 | | | 4.290 | Y | Y | N | Y | Y | N | NR | N | C | N | N | Salary | II | Y | Y |
| 30 | 1,500 | M | 10 | | 3 | | | 0.220 | Y | Y | N | Y | Y | N | NR | N | N | Pay | N | N | IIIB | Y | |
| 31 | 32,000 | M | 14 | | 10 | | | 3.520 | Y | Y | N | Y | Y | N | Y | N | C | Telem | N | More Training of Personnel | II | Y | |
| 32 | 27,000 | M | 16 | | 11 | | | 3.950 | Y | Y | N | Y | N | Y | NR | N | C | Chore Add Lime | T&O | N | II | Y | |
| 33 | 60 | M | 12 | | 5 | | | - | Y | Y | N | Y | Y | N | Y | N | C | - | - | - | IIB | Y | Y |
| 34 | 23,700 | M | 14 | | 15 | | | 3.800 | Y | Y | N | Y | N | Y | Y | N | N | N | N | N | II | Y | |
| 35 | 3,500 | M | 10 | | 5 | | | 0.400 | Y | Y | N | Y | Y | N | NR | N | C | Pay | N | Pay | IIB | Y | Y |
| 36 | 14,000 | C | 12 | | 2 | | | 1.070 | Y | Y | N | Y | Y | N | NR | N | N | N | Rust | N | II | Y | |

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-N

| Code N- | Population Served | Ownership | Total Samples-CWSS | Source | | | | Average Day | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections | | Chlorination | Fluoridation | Additional Treatment | Complaints | | | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S | G | A | O | MGD | | | | | Code | Prog | | | | Oper | Cust | Mang | | NYS | PHS |
| 37 | 49,000 | M | 20 | | 10 | | | 3.800 | Y | Y | N | Y | N | Y | NR | N | CF | N | N | N | IB | Y | |
| 38 | 25,000 | M | 13 | | 4 | | | 2.120 | Y | Y | N | Y | Y | N | Y | N | C | - | - | - | IIB | | |
| 39 | 36,000 | M | 15 | | 10 | | | 4.400 | Y | Y | N | Y | Y | N | NR | N | C | - | Rust | N | IIB | | |
| 40 | 29,300 | M | 19 | | 7 | | | 2.980 | Y | Y | N | Y | Y | N | Y | N | C | Pay | Cost | Low Pay<br>Hard to get personnel | II | Y | |
| 41 | 12,300 | M | 14 | | 4 | | | 1.320 | Y | Y | N | Y | Y | N | NR | N | N | Pay | Cost | N | IIIB | Y | |
| 42 | 200 | S | 8 | | 2 | | | 0.060 | Y | N | N | Y | Y | N | NR | N | N | Rust | Rust | N | LNR | | |
| 43 | 400 | S | 12 | | 2 | | | - | Y | Y | N | Y | N | N | NR | N | N | - | Pressure | Money for R&M | LNR | Y | Y |
| 44 | 70 | C | 8 | | 1 | | | - | Y | N | N | Y | N | N | NR | N | N | N | Flame Taps | N | LNR | | |
| 45 | 240 | M | 8 | | 2 | | | 0.025 | Y | Y | N | Y | Y | N | NR | N | N | N | Rust | N | III | Y | |
| 47 | 500 | S | 8 | | 1 | | | 0.095 | Y | Y | N | Y | Y | N | NR | N | N | - | N | - | LNR | Y | Y |

## TABLE 3-N

### VALUES EXCEEDING DRINKING WATER STANDARDS
(Based on Community Water Supply Study Sampling Only)

| Code N- | Constituents | Finished Water | | Distribution System | | | | Number of Samples |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 1 | 2 | 3 | | |
| 2 | $NO_3$(45) + | 72.5 | 0.6 | | | | | |
| 6 | Fe(0.3)s | 0.078 | | 0.808 | 1.425 | 0.109L | 0.217NH | 6 |
| 11 | Fe(0.3) + | 0.007 | 0.009 | 0.788 | 0.056 | 0.060 | | |
| | | 0.006 | | | | | | |
| 12 | Fe(0.3) + | 0.009 | 0.017 | 0.377 | 0.016 | 0.017 | | |
| 14 | Mn(0.05)+ | 0.047 | | 0.095 | 0.000L | 0.047NH | | 6 |
| 16 | Cu(1.0) + | | | 1.33 | 0.136L | 0.210NH | | |
| 17 | Fe(0.3)s+ | 0.187 | | 0.638 | 0.545 | 0.488 | | |
| | | | | | 0.023L | 0.046NH | | 6 |
| 20 | Fe(0.3) | 0.437 | | 1.159 | 0.348 | 0.166 | 0.205 | |
| 20 | Mn(0.05) | 0.143 | | 0.072 | 0.019 | 0.031 | 0.027 | |
| 21 | Fe(0.3) + | | | 0.396 | 0.465 | 0.680 | | 13 |
| | | | | | 0.032L | 0.299NH | | |
| 22 | Fe(0.3)s+ | 0.628 | | 0.443 | 0.018L | 0.139NH | | 5 |
| 22 | Cu(1.0) | 0.075 | | 3.306 | 4.22 | 0.201L | 0.932NH | 5 |
| 26 | Fe(0.3)s | 0.162 | 0.338 | 0.573 | 0.790 | 0.175L | 0.229NH | 11 |
| | | 0.682 | 0.868 | 0.361 | 0.697 | 0.999 | 0.700 | |
| | | | | | 0.767 | 0.697 | | |
| 26 | $NO_3$(45) + | 79.5 | 0.3 | | | | | 6 |
| | | < 0.1 | | | | | | |
| 26 | *MBAS(0.5) | 0.675 | | | | | | 6 |
| 26 | *AS(.01) | < 0.03 | | | | | | |
| 27 | Cu(1.0) + | 0.192 | 0.113 | 1.10 | 1.56 | | | |
| 29 | Fe(0.3)s | | | 2.76 | 0.104 | 0.034 | 0.048 | |
| 32 | Fe(0.3) + | | | 0.477 | 0.075 | 0.157 | 0.217 | |
| 32 | Mn(0.05)+ | | | 0.063 | 0.004 | 0.004 | 0.004 | |
| 34 | M-Pb(0.05)+ | 0.000 | 0.010 | 0.108 | 0.000 | 0.011 | | |
| 34 | Cu(1.0) + | 0.052 | 0.317 | 3.52 | 0.126 | 0.361 | | |
| 37 | Fe(0.3)s+ | | | 0.373 | 0.227L | 0.240NH | | 6 |
| 38 | Fe(0.3)s | 0.488 | | 0.376 | 0.438 | 0.638 | | |
| 40 | Fe(0.3)s | 1.76 | 0.296 | 0.450 | 0.843 | 0.582 | 0.479 | |
| | | 0.595 | | 0.515 | | | | |
| 40 | Mn(0.05) | 0.114 | 0.081 | 0.102 | 0.082 | 0.101 | 0.101 | |
| | | 0.120 | | 0.106 | | | | |
| 42 | Fe(0.3) | 0.021 | | 5.11 | 0.226 | | | |
| 45 | Fe(0.3) + | 0.393 | | 0.030 | 0.018 | - | | |
| 41 | M-Pb(0.05) | 0.007 | .079 | 0.32 | 0.019 | 0.014 | | |

Finished Water - as delivered to distribution system, treated or untreated.

| | |
|---|---|
| + | Average of samples did not exceed standard |
| ( ) | Public Health Service, Drinking Water Standards |
| M | Mandatory Standard |
| ___ | Exceeds Standard |
| L | Lowest sample value |
| NH | Next highest sample value |
| s | Sequestering iron |
| * | From shallow wells not in use, tested at county health department's request. Data sought to determine feasibility of using aquifer again. |

COMMENTS ON WATER SUPPLY SYSTEMS LISTED IN TABLE 3-N

N- 2 Village of Bayville Water Department

This municipal system serves 5,800 from two wells. The Community Water Supply Study samples from the wells had nitrate values of 72.5 and 0.6 ppm. Mixing provides water to the consumer that has a content of less than Public Health Service limit of 45 ppm; however, should the low nitrate well be taken out of service for any reasons the standard would be exceeded.

N-14 Hicksville Water District

This municipal supply serves 59,800 from 15 wells. One distribution sample had a manganese content of 0.095 ppm, while this exceeded the Public Health Service standard of 0.05 it was well within the New York State Standard of 0.3 ppm. Five other distribution samples and a finished water sample met the Public Health Service standard.

N-16 Jericho Water District

This municipal system serving 60,000 from 19 wells is providing treatment. One distribution system sample had a copper content of 1.33 ppm which is over the limit of 1.0 ppm. However, since five other samples varied between 0.136 and 0.210 the one high value appears to be a local problem. Shortly after the Community Water Supply Study visit, treatment was added to control this problem.

N-20 **City of Long Beach Water Department**

Using eight wells this municipal system serves 35,000. One finished water sample taken during the Community Water Supply Study had an iron content of 0.437 ppm. County records for 1967 and 1968 show an average iron content of 3.53 ppm for this supply's sources. One distribution system sample out of four also exceeded the limit of 0.3. The same situation occurred for manganese, one finished water and one distribution system sample exceeded the Public Health Service limit of 0.05, however, none exceeded the State standard of 0.3 ppm. The municipality has recognized these problems and, realizing that the existing treatment plant has inadequacies, is building a new plant.

N-22 **Manhansett-Lakeville Water District**

This municipal system serves 42,700 from 13 wells. Two distribution system samples had copper contents of 3.306 and 4.22 ppm while three other samples were within the 1.0 ppm limit. One distribution system sample had 0.443 ppm of iron and the finished water sample had 0.628. Although county records show an average of 0.05 for all the wells, the water is slightly corrosive and the county indicates more treatment is necessary.

N-26 New York Water Service

This municipal system serving 165,000 from 17 wells had two finished water samples and eight of eleven distribution samples with iron contents well above the 0.3 ppm limit; however, sequestering of iron has resulted in no complaints. One finished water sample had 79.5 ppm of $NO_3$. Blending with other wells provides a water with nitrates less than the limit.

One shallow well not used was sampled at the request of the county health department to determine if there had been any improvement in the quality of the water in the particular aquifer. Two constituents, arsenic and MBAS, exceeded the standards which indicates no improvement.

N-27 Old Westbury Water District

This small municipal system uses four wells to serve 2,500. Two distribution system samples had copper contents of 1.10 and 1.56 ppm, while two finished water samples were well under the 1.0 ppm standard. These results were the same as county records indicating inadequate treatment for a corrosive water.

N-34 Roslyn Water District

This municipal system serves 23,700 from 15 wells. One distribution system sample had a lead content of 0.108 ppm and a copper content of 3.52 ppm. Four finished water samples and four other distribution system samples had values less than the standards for both constituents. This local problem has been investigated.

N-40 **West Hempstead-Hempstead Gardens Water District**

This municipal system serves 29,300 from 7 wells. Three finished water samples and five distribution systems samples all had a manganese content above the Public Health Service standards; however, the highest of 0.120 ppm was well below the state limit of 0.3 ppm. With the exception of one finished water sample the same situation existed for iron. The system is sequestering the iron.

The following water supply systems had one or more iron samples exceeding the standard. From 3 to 13 samples were taken for each system. Five systems, as indicated (s), are sequestering the iron.

| | | Serves | Wells |
|---|---|---|---|
| N-6(s) | East Meadow Water District | 49,000 | 11 |
| N-11 | Incorporated Village of Garden City Water Department | 24,000 | 9 |
| N-12 | Garden City Water Department | 24,000 | 8 |
| N-17(s) | Levittown Water District | 55,000 | 15 |
| N-21 | Long Island Water Corp. | 261,000 | 159 |
| N-29(s) | Plainview Water District | 40,000 | 10 |
| N-32 | Rockville Centre Department of Water Supply | 27,000 | 11 |
| N-37(s) | South Farmingdale Water District | 49,000 | 10 |
| N-38(s) | Uniondale Water District | 25,000 | 4 |
| N-42 | State University of New York | 200 | 2 |
| N-45 | Mill Neck Estates | 240 | 2 |

NASSAU COUNTY EXCERPT FROM CROSS-CONNECTION CONTROL REPORT
Terrance L. Campbell, PHS Engineer

Code
N-

21 Long Island Water Corporation, Lynbrook, New York

| | |
|---|---|
| Population Served | 261,000 |
| Number of establishments visited | 1 |
| Number of hazards observed- Total | 15 |
| Hospital | - |
| Sewage Treatment Plant | 15 |
| Metal Plating Plant | - |

This private utility does not have a continuous program for the detection and elimination of cross-connection and hazardous plumbing connections within the distribution system. Activities are limited to initial inspections during installation of meters at selected facilities. Meter readers routinely follow-up unusually high or low readings with inspection. The Long Island Water Corporation service area overlaps at least three different municipalities each with its own building inspection department. Water authorities indicated that none of the three maintained a program for continuous reinspection. More emphasis on cross-connection control is required of this water supply. Closer cooperation between water authorities, county health authorities, and municipal inspectors is necessary. Adequate codes may very well exist to promote a program.

Code
N-

26 New York Water Service - Merrick Division, Merrick, New York

| | |
|---|---|
| Population Served | 165,000 |
| Number of establishments visited | 0 |
| Number of hazards observed- Total | 0 |
| Hospital | 0 |
| Sewage Treatment | 0 |
| Metal Plating Plant | 0 |

This utility did not serve any of the three types of establishments normally inspected. This does not mean that no program is required but does indicate that the scope of any cross-connection control program should be suited to the service area i.e., residential vs. industrial. Regardless of the hazards observed, this water company had no program to eliminate cross-connections except as the result of a complaint.

One problem particular to this water supply is the occurrence and ease of obtaining private wells. Newly acquired customers previously depended upon private wells as a source. Emphasis is needed in this aspect of cross-connection control.

The plumbing inspector from Hempstead, New York, the primary incorporated area being served by this utility, indicated that no reinspection program existed. His plumbing inspection department had many varied duties including cross-connections. This inspector was aware of cross-connection control activities of county and State agencies dealing with specific facilities such as waste treatment plants and institutions.

SUFFOLK

In Suffolk County the entire responsibility for water supplies is in the Water Supply and Surveillance unit of the Division of Environmental Health of the Department of Health.

The County is over a hundred miles in length from the Nassau County line to Montauk and covers 922 square miles, which is more than the combined areas of the three other counties in this study. In the 1960 census its population was 666,684, in 1969 it was estimated at 1,200,000. This is an average growth of over 70,000 per year for the nine years. This population explosion combined with the geography has resulted in about 100 water supplies. For the past several years the number has remained more or less constant in spite of the Suffolk County Water Authority taking over three to four small supplies each year. Presently the Authority is serving over 50% of the estimated population. The great number of small supplies combined with a steady increase in plant facilities, as for example, six new water supply wells each month, imposes an impossible burden on the small staff of the Water Supply and Surveillance Unit. This unit is also responsible for water pollution throughout the County. The present staff of one engineer and two sanitarians should be at least doubled in order to carry on a drinking water program that will insure state standards are being complied with.

While county laboratory facilities are capable of carrying out all tests relative to drinking water standards, additional staff and equipment are required to carry out an adequate program on the county level that will assist in obtaining compliance with standards. These two factors also prevent any special investigations relative to such items as pesticides, insecticides, and the new synthetic organic chemicals which are of great concern to staff.

While the Community Water Supply Study did not find any supplies with bad water and such risks that service should be discontinued, the need for added support on the county level was evident.

SUFFOLK COUNTY
DEPARTMENT OF HEALTH
SUFFOLK COUNTY CENTER
RIVERHEAD, NEW YORK 11901

DIVISION OF ENVIRONMENTAL
HEALTH SERVICES
HERBERT W. DAVIDS, P.E.
DIRECTOR

July 8, 1969

Dear Sir:

The Suffolk County Health Department, in cooperation with the New York State Health Department and United States Public Health Service, is planning a special survey of all domestic water systems in Rockland, Westchester, Nassau, Suffolk Counties and the five boroughs of New York City. The survey began on May 1, 1969. This study is a portion of a nationwide survey being carried out in nine areas throughout the United States, one in each U.S. Public Health Service region.

The purpose of this study is to determine if the water being served in domestic systems meets the Public Health Service's Drinking Water Standards. The Public Health Service will not only review the bacteriological and chemical history of the water supplies surveyed, but will also collect samples for their own analysis. In addition, a sanitary survey will be made of the water system, facilities, and operation.

Your office will be contacted in the near future (one to eight weeks) by the Public Health Service, and an appointment made for the survey at a mutually agreeable time.

Your cooperation in this will be sincerely appreciated.

Very truly yours,

HW Davids

H.W. Davids, P.E.
Director of the Division of
Environmental Health Services

HWD/gph

SUMMARY: Based on systems studied

Total Population - 1,200,000

Population served by public water supply systems (Includes 23,865 summer residents) - 902,206

Population not served by public water supply systems - 321,659

Total number of supply systems (Municipally, publicly owned 43, privately owned 20, Institutional 8) - 71

Sources: Surface 2 Ground 411 Other 5

Consumption Average Day 81,932 MGD for 51 supply systems reporting

Number of supply systems serving 1,000 or less - 33

Number of Bacteriological Samples required annually to meet PHS Standards - 12,618

Number of Bacteriological Samples required annually to meet New York State Standards - 7,224

Number of supply systems taking sufficient samples to meet PHS Standards - 1

Number of supply systems taking sufficient samples to meet New York State Standards - 3

Number of additional samples supply systems would have to take to meet New York State Standards - 2,013

| | No of Systems | Pop Served |
|---|---|---|
| Fluoridated | 0 | 0 |
| Operator holds State license | 21 | 737,865 |
| Operator license not required - no treatment | 35 | 71,256 |
| Unlicensed operator-violation of State Sanitary Code | 15 | 93,085 |
| Chlorinating | 9 | 674,530 |
| Chlorination not required - source wells only | 56 | 203,411 |
| Not chlorinating-violating County Order | 6 | 24,265 |
| Supply systems served by a State Approved Laboratory | 69 | 281,266 |
| Supply systems having a chemical analysis | 64 | 899,436 |
| Supply systems having a radiological analysis | 0 | 0 |
| Supply systems having a sanitary survey | 37 | 804,330 |
| Cross-Connection - code | 27 | 731,966 |
| Cross-Connection - active program | 2 | 6,500 |

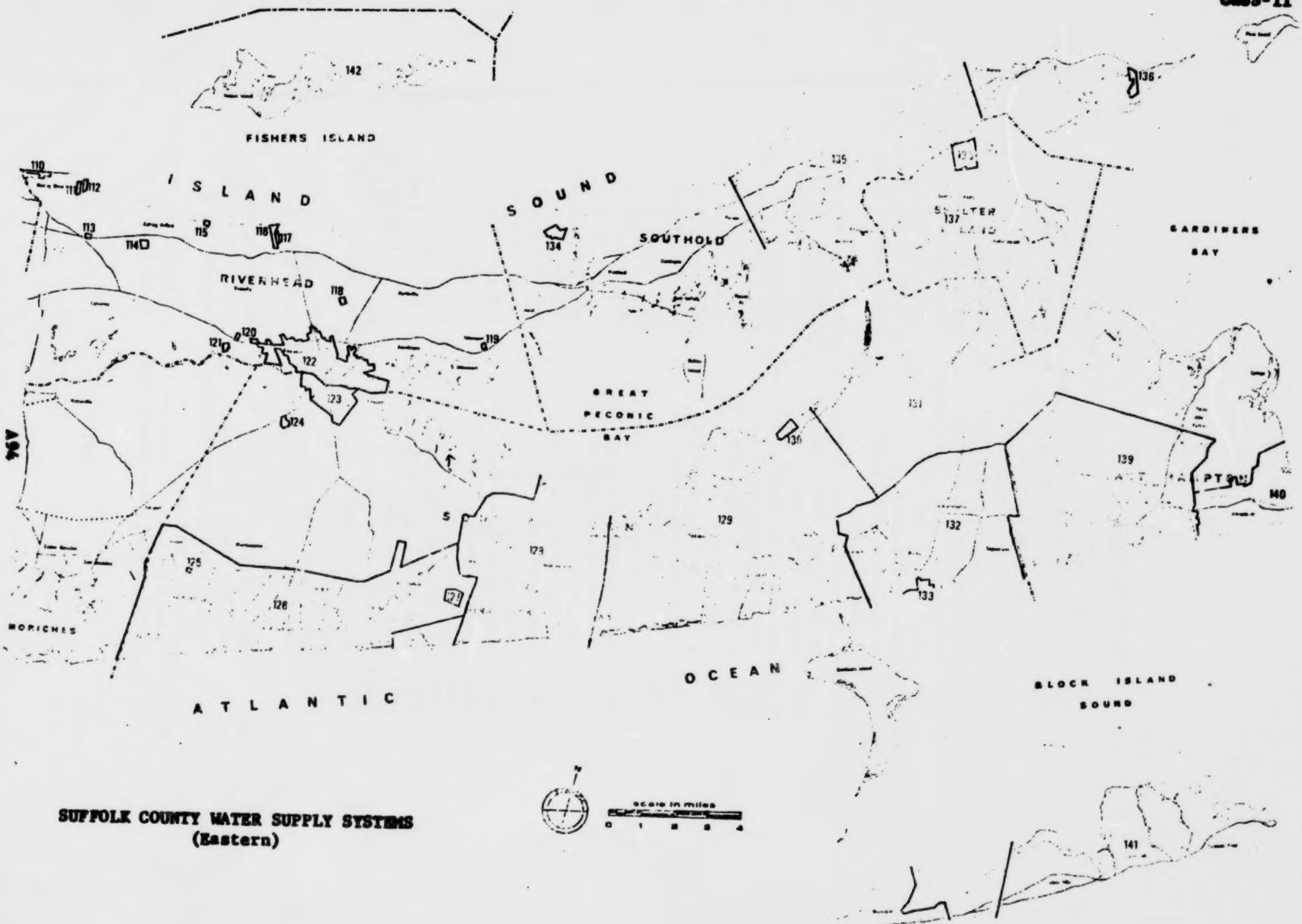
## LISTING OF WATER SUPPLIES IN THE COMMUNITY WATER SUPPLY STUDY

## SUFFOLK COUNTY

| Code S- | Name of Supply | Location |
|---|---|---|
| 1 (67) | Brentwood Water Dist | Brentwood, L.I. N.Y. |
| 2 (79) | Cherry Grove Water Dist | Cherry Grove, Fire Isl, N.Y. |
| 3 (138) | Dering Harbor Village | Shelter Island, N.Y. |
| 4 (52) | Dix Hills Water Dist | Town Hall, Huntington, N.Y. |
| 5 (53) | East Farmingdale Water Dist | Farmingdale, N.Y. |
| 6 (71) | Fair Harbor Water Dist | Fair Harbor, Fire Isl, N.Y. |
| 7 (80) | Fire Island Pines Water Dist | Fire Island, N.Y. |
| 8 (49) | Greenlawn Water Dist | Greenlawn, N.Y. |
| 9 (135) | Village of Greenport | Greenport, N.Y. |
| 10 (128) | Hampton Bays Water Dist | Hampton Bays, N.Y. |
| 11 (75) | Ocean Beach Water Co | Ocean Beach, Fire Isl, N.Y. |
| 13 (122) | Riverhead Water Dist | Riverhead, N.Y. |
| 14 (123) | Riverside Water Dist | Riverhead, N.Y. |
| 15 (60) | St. James Water Dist | St. James, L.I. N.Y. |
| 16 (70) | Saltaire Water Dist | Village of Saltaire, Fire Isl, N.Y. |
| 17 (58) | Smithtown Water Dist | Kings Park, N.Y. |
| 18 (50) | South Huntington Water Dist | Huntington Station, N.Y. |
| 19 (84) | Stony Brook Water Dist | Stony Brook, N.Y. |
|  | Suffolk County Water Authority | Oakdale, N.Y. |
| 20A (55) | Amityville Service Area |  |
| 20B (54) | Babylon Service Area |  |
| 20C (66) | Bayshore Service Area |  |
| 20D (139) | East Hampton Service Area |  |
| 20E (47) | Huntington Service Area |  |
| 20F (48) | North Port Service Area |  |
| 20G (68) | Patchoque Service Area |  |
| 20H (85) | Port Jefferson Service Area |  |
| 20I (131) | Sag Harbor Service Area |  |
| 20J (57) | Smithtown-King Park Service Area |  |
| 20K (129) | Southampton Service Area |  |
| 20L (126) | Westhampton Service Area |  |
| 21 (140) | Amagansett Water Co | Amagansett, N.Y. |
| 22 (104) | Oak Wood Development Water Supply | Ronkonkoma, N.Y. |
| 23 (95) | North Shore Water Co | Rocky Point, N.Y. |
| 24 (115) | Baiting Hollow Lodge | Calverton, N.Y. |
| 25 (114) | Thurms Mobile Homes Estates | Riverhead, N.Y. |
| 27 (101) | Bevon Water Corp | Huntington, N.Y. |
| 28 (132) | Bridgehampton Water Co | Bridgehampton, N.Y. |
| 29 (134) | Captain Kidd Water Co | Wantagh, N.Y. |
| 33 (130) | Colony Beach Front Assoc | Southampton, N.Y. |
| 34 (86) | Crystal Brook Park Assoc | Mt. Sinai, N.Y. |

( ) Code number for locating systems on map of Suffolk County, Pages A94 and A95

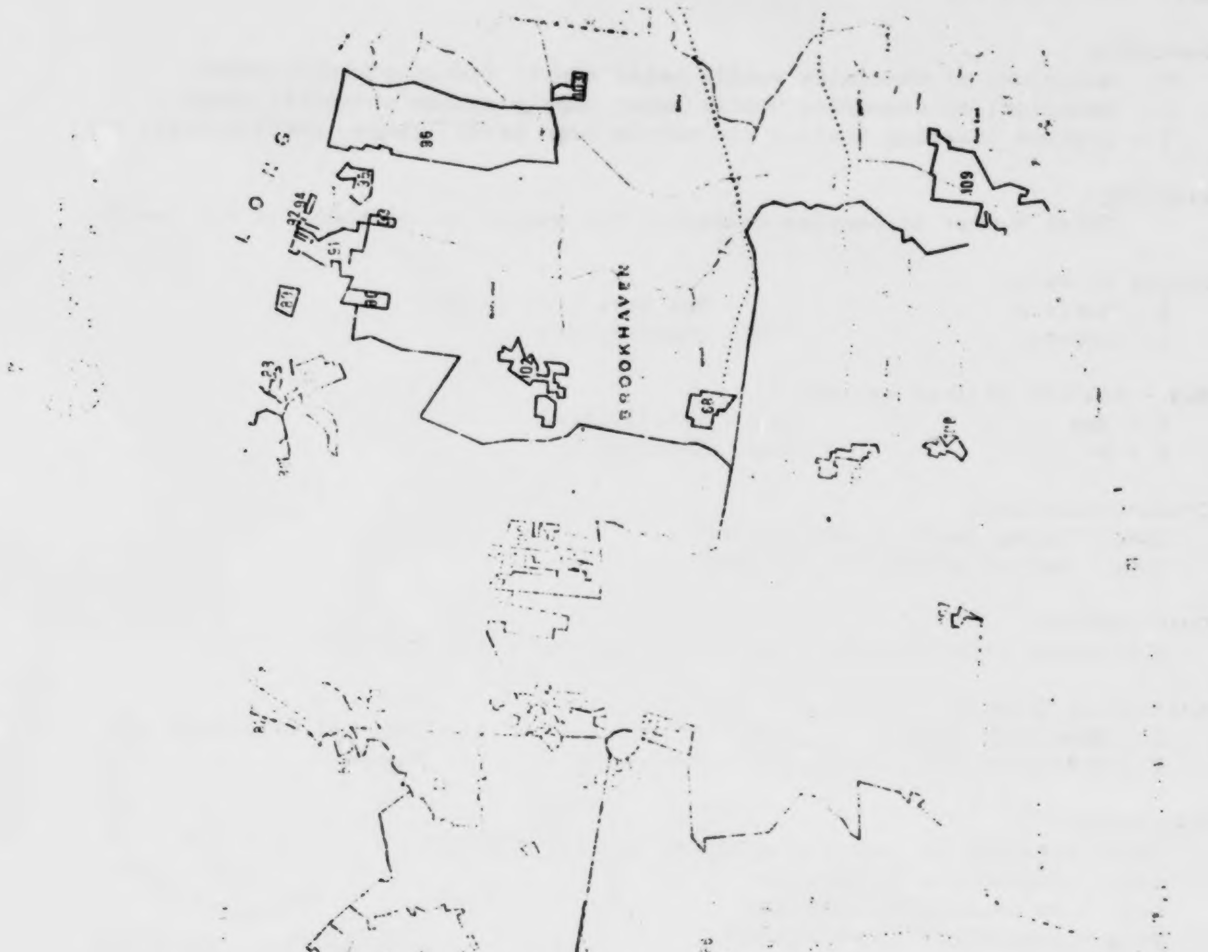
| Code S- | Name of Supply | Location |
|---|---|---|
| 35 (94) | Culross Corp | Rock Point, N.Y. |
| 36 (81) | Davis Park Water Works Co,Inc. | Davis Park, Fire Isl, N.Y |
| 37 (74) | Dune Realy Corp (Fire Isl Summer Club) | Fire Island, N.Y. |
| 38 (72) | Dunewood Water Dept | Dunewood, Fire Isl, N.Y. |
| 39 (102) | Eastern Suffolk Water Co | Patchoque, N.Y. |
| 40 (110) | Wading River Water Works | Wading River, N.Y. |
| 41 (142) | Fisher Isl Water Works Assoc | Fisher Island, N.Y. |
| 43 (91) | Great Beach Water Co | Rocky Point, N.Y. |
| 46 (111) | Herod Point Estates | Wading River, N.Y. |
| 47 ( 98) | Cedar Grove Civic Assoc Water Supply | Lake Grove Village, N.Y. |
| 49 (113) | Ramblewood Trailer Park | Wading River, N.Y. |
| 50 (116) | Reeves Beach Park Assoc | Riverhead, N.Y. |
| 51 (69) | Kismet W. P. Corp | Fire Island, N.Y. |
| 54 (141) | Montauk Water Supply | Montauk, N.Y. |
| 57 (77) | Ocean Bay Park Water Co | Ocean Bay Park, Fire Isl, N.Y. |
| 58 )97) | Parsnip Pond Water Co | Great Neck, N.Y. |
| 61 (78) | Point O'Woods | Point O'Woods, Fire Isl, N.Y. |
| 64 (121) | Roll In Mobile Home Park | Calverton, N.Y. |
| 65 (105) | Ronkonkama Water Co, Inc | Lake Ronkonkama, N.Y. |
| 66 (76) | Seaview Utilities | Seaview, N.Y. |
| 67 (100) | Selden Water Co | Roslyn Heights, N.Y. |
| 68 (89) | Scott's Beach Country Club | Miller Place, N.Y. |
| 6 9(137) | Shelter Island Heights Assoc | Shelter Island, N.Y. |
| 70 (127) | Community Water Corp | East Quogue, N.Y. |
| 71 (109) | Shirley Water Works Co | Shirley, N.Y. |
| 72 (96) | Shorewood Water Corp | Port Jefferson, N.Y. |
| 74 (112) | Sound Shore Club Corp | Wading River, N.Y. |
| 75 (83) | Sound View Assoc Inc | Stony Brook, N.Y. |
| 77 (99) | Sunhill Water Corp | Selden, N.Y. |
| 78 (106) | Swan Lake Water Co | East Patchoque, N.Y. |
| 79 (92) | Terrances on the Sound | Rocky Point, N.Y. |
| 80 (56) | West Gilgo Beach Assoc | West Gilgo Beach, Fire Isl, N.Y. |
| 81 (82) | West Meadow Beach Assoc | Port Jefferson, N.Y. |
| 82 (124) | Wildwood Lake Water Co | Riverhead, N.Y. |
| 83 (51) | Woodbury Triangle Inc (Cold Spring Hills Water Supply) | Huntington, N.Y. |
| 86 (107) | Blue Point Community Assoc | Blue Point, N.Y. |
| 88 | State Univ Agriculture and Technical Institute | Farmingdale, N.Y. |
| 89 | Suffolk State School | Melville, N.Y. |
| 90 | Pilgrim State Hospital | West Brentwood, N.Y. |
| 91 | Central Islip State Hospital Water Supply | Central Islip, N.Y. |
| 92 | Kings Park State Hospital | Kings Park, N.Y. |
| 93 | West Island Homeowner's Assoc | West Island, N.Y. |


142
FISHERS ISLAND
110
111
112
ISLAND
SOUND
113
114
115
116
117
RIVERHEAD
118
119
120
121
122
123
124
134
SOUTHOLD
135
136
137
SHELTER ISLAND
GARDINERS BAY
GREAT PECONIC BAY
130
131
139
140
129
132
133
125
126
127
128
MORICHES
ATLANTIC
OCEAN
BLOCK ISLAND SOUND
141
N
scale in miles
0 1 2 3 4

SUFFOLK COUNTY WATER SUPPLY SYSTEMS
(Eastern)

Reproduced from best available copy.

# SUFFOLK COUNTY WATER SUPPLY SYSTEMS
(Western)


LONG
36
35
94
91
81
60
23
40
BROOKHAVEN
58
109
53

KEY: For Table 2-S

Ownership
M - Municipal or community public water supply system publicly owned
C - Municipal or community public water supply system privately owned
S - Systems covering trailer and mobile home parks, camps, institutions, etc.

Sampling
Total number of samples collected for system during CWSS for all tests

Source of Water
S - Surface A - New York City Aqueducts
G - Ground O - Other System

MGD - Million gallons per day
Y - Yes Rad - Radiological
N - No Chem - Chemical

Cross-Connections
Code - Using local or state code
Prog - Active continuing program

Chlorination
Y - System chlorinating NR - Not required R - Required

Additional Treatment
C - Chemicals used F - Filtration I - Iron and manganese removal
S - Sedimentation S - Softening

Complaints
(Most frequent as reported by water utility staff)
Oper - Complaints by operator
Cust - Complaints by customer
Mang - Complaints by management

Licensing
LNR - License not required LR - License required
(Otherwise grade is indicated)

Annual Bacteriological Sampling, Frequency Meets Requirements - NYS, PHS
Annual Bacteriological Sampling Frequency Meets Requirements of
New York State - Public Health Service

( ) * Summer

( ) ** Bottle Water Supply

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-S

| Code S- | Population Served | Ownership | Total Samples-CWSS | Source |  |  | Average Day | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections |  | Chlorination | Fluoridation | Additional Treatment | Complaints |  |  | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  | S | G | O | MGD |  |  |  |  | Code | Prog |  |  |  | Oper | Cust | Mang |  | NYS | PHS |
| 1 | 24,000 | M | 14 | - | 6 | - | 2.000 | Y | Y | N | Y | Y | N | NR | N | C | Pay | Dis-coloration | Oper Training | IIIB |  |  |
| 2 | ( 2,500)* | M | 8 | - | 1 | - | - | Y | Y | N | N | Y | Y | NR | N | N | N | N | N | IIB |  |  |
| 3 | 150 | M | 6 | - | 2 | - | 0.006 | Y | N | N | Y | Y | N | R | N | C | Need More Help | N | N | LR |  |  |
| 4 | 14,000 | M | 10 | - | 6 | - | 2.000 | Y | Y | N | Y | Y | N | NR | N | C | More Training | Corrosion | N | III |  |  |
| 5 | 3,850 | M | 10 | - | 2 | - | 1.250 | Y | Y | N | Y | Y | N | NR | N | C | N | Cost | Can't get help<br>Low Pay | IIB |  |  |
| 6 | ( 1,200)* | M | 8 | - | 1 | - | 0.080 | Y | N | N | N | N | N | NR | N | N | N | Rust | - | IIIB |  |  |
| 7 | ( 4,000)* | M | 10 | - | 2 | - | 0.150 | Y | Y | N | Y | Y | Y | Y | N | N | N | N | N | IIIB |  |  |
| 8 | 29,000 | M | 10 | - | 13 | - | 3.327 | Y | Y | N | Y | Y | N | Y (1 well) | N | N | - | N | - | III |  |  |

# SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

## TABLE 2-S

| Code S- | Population Served | Ownership | Total Samples-CWSS | Source |  |  | Average Day | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections |  | Chlorination | Fluoridation | Additional Treatment | Complaints |  |  | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  | S | G | O | MGD |  |  |  |  | Code | Prog |  |  |  | Oper | Cust | Mang |  | NYS | PHS |
| 9 | 5,700 | M | 12 | - | 14 | - | 0.600 | Y | Y | N | Y | Y | N | Y | N | N | - | Cost<br>Color | - | III |  |  |
| 10 | 4,000 | M | 8 | - | 3 | - | 0.430 | Y | Y | N | N | N | N | NR | N | N | - | Press | Funds | LNR |  |  |
| 11 | ( 6,000)*<br>200 winter | M | 8 | - | 2 | - | 0.200 | Y | Y | N | Y | N | N | NR | N | N | Pay | Rust | - | III |  |  |
| 13 | 7,215 | M | 17 | - | 4 | - | 1.040 | Y | Y | N | N | N | N | R | N | C | N | Turb<br>Rust | - | IIIB | Y |  |
| 14 | 1,200 | M | 4 | - | - | 1 | - | Y | Y | N | N | N | N | R | N | N | - | - | - | LR |  |  |
| 15 | 6,200 | M | 4 | - | - | 1 | 0.500 | Y | Y | N | N | N | N | NR | N | N | T&O<br>Color | T&O<br>Rust | - | LNR |  |  |
| 16 | ( 1,000)* | M | 8 | - | 1 | - | 0.015 | Y | N | N | N | N | N | NR | N | N | Area Developed too fast | Rust | - | LNR |  |  |
| 17 | 35,000 | M | 4 | - | - | 1 | 1.300 | Y | Y | N | N | N | N | NR | N | N | - | Press | - | LNR |  |  |
| 18 | 50,000 | M | 13 | - | 12 | - | 5.000 | Y | Y | N | Y | N | N | NR | N | N | N | Cost | N | LR | Y |  |
| 19 | 4,000 | M | 4 | - | - | 1 | 0.260 | Y | Y | N | Y | Y | N | NR | N | N | N | Cost | N | III |  |  |

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-S

| Code S- | Population Served | Ownership | Total Samples-CWSS | Source S | Source G | Source O | Average Day MGD | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections Code | Cross-Connections Prog | Chlorination | Fluoridation | Additional Treatment | Complaints Oper | Complaints Cust | Complaints Mang | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements NYS | Annual Bact Sampling Frequency Meets Requirements PHS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 A | 34,000 | M | | - | 10 | - | 2.170 | N | Y | N | Y | Y | N | Y | N | C | N | Chlor | N | I | | |
| B | 124,000 | M | | - | 38 | - | 10.720 | N | Y | N | Y | Y | N | Y | N | C | N | Chlor | N | I | | |
| C | 144,000 | M | | - | 46 | - | 10.490 | N | Y | N | Y | Y | N | Y | N | C | N | Chlor | N | I | | |
| D | 8,660 | M | | - | 5 | - | 0.620 | N | Y | N | Y | Y | N | Y | N | C | N | - | N | I | | |
| E | 47,500 | M | | - | 23 | - | 5.010 | N | Y | N | Y | Y | N | Y | N | C | N | - | N | I | | |
| F | 46,300 | M | | - | 12 | - | 5.030 | N | Y | N | Y | Y | N | Y | N | - | N | - | N | I | | |
| G | 81,500 | M | | - | 24 | - | 6.480 | N | Y | N | Y | Y | N | Y | N | C | N | - | N | I | | |
| H | 61,400 | M | | - | 23 | - | 6.210 | N | Y | N | Y | Y | N | Y | N | C | N | - | N | I | | |
| I | 3,170 | M | | - | 3 | - | 0.260 | N | Y | N | Y | Y | N | Y | N | C,I<br>S,F | N | - | N | I | | |
| J | 53,600 | M | | - | 27 | - | 7.300 | N | Y | N | Y | Y | N | Y | N | C | N | - | N | I | | |
| K | 7,600 | M | | - | 4 | - | 0.710 | N | Y | N | Y | Y | N | Y | N | C | N | - | N | I | | |
| L | 8,650 | M | | - | 13 | - | 1.010 | N | Y | N | Y | Y | N | Y | N | C | N | - | N | I | | |
| 20 | 620,880 | Total | 235 | | 228 | - | 56.010 | | | | | | | | | | | | | | Y | Y |

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

## TABLE 2-S

| Code S- | Population Served | Ownership | Total Samples-CWSS | Source | | | Average Day MGD | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections | | Chlorination | Fluoridation | Additional Treatment | Complaints | | | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S | G | O | | | | | | Code | Prog | | | | Oper | Cust | Mang | | NYS | PHS |
| 21 | 3,000 | C | 8 | - | 4 | - | 0.800 | Y | Y | N | Y | Y | N | NR | N | N | N | Rust | N | IIIB | | |
| 22 | 100 | C | 6 | - | 2 | - | - | Y | N | N | Y | N | N | NR | N | N | N | Press | N | LNR | | |
| 23 | 2,800 | C | 10 | - | 2 | - | - | Y | Y | N | Y | Y | N | NR | N | N | Help Shortage | Press<br>Rust | Help Shortage | LNR | | |
| 24 | ( 180)* | C | 7 | - | 1 | - | 0.001 | Y | Y | N | Y | N | N | NR | N | N | N | N | N | LNR | | |
| 25 | ( 140)* | S | 10 | - | 1 | - | 0.010 | Y | Y | N | N | N | N | NR | N | N | N | N | N | LNR | | |
| 27 | 1,120 | C | 9 | - | 2 | - | - | Y | Y | N | Y | N | N | NR | N | C | N | Cost | - | LR | | |
| 28 | 1,600 | C | 6 | - | 3 | - | 0.190 | Y | Y | N | Y | N | N | NR | N | N | - | Cost | - | LNR | | |
| 29 | ( 400)* | C | 7 | - | 2 | - | 0.040 | Y | Y | N | Y | N | N | NR | N | N | - | Press | - | LNR | | |
| 33 | ( 125)* | C | 7 | - | 1 | - | 0.010 | Y | Y | N | N | N | N | NR | N | N | N | N | N | LNR | | |
| 34 | ( 80)* | C | 8 | - | 1 | - | 0.001 | Y | N | N | Y | N | N | NR | N | N | N | N | N | LNR | | |
| 35 | ( 100)* | C | 6 | - | 1 | - | - | Y | Y | N | N | N | N | NR | N | N | N | N | N | LNR | | |
| 36 | 4,000 | C | 8 | - | 1 | - | 0.066 | Y | Y | N | N | N | N | NR | N | N | Income | N | - | LNR | | |

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-S

| Code S- | Population Served | Ownership | Total Samples-CWSS | Source S | Source G | Source O | Average Day MGD | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections Code | Cross-Connections Prog | Chlorination | Fluoridation | Additional Treatment | Complaints Oper | Complaints Cust | Complaints Mang | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements NYS | Annual Bact Sampling Frequency Meets Requirements PHS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 37 | ( 200)* | C | 8 | - | 1 | - | - | Y | Y | N | N | N | N | NR | N | N | N | Rust | N | LNR | | |
| 38 | ( 400)* | C | 8 | - | 1 | - | 0.080 | Y | Y | N | Y | N | N | NR | N | C | Water Lawn | N | N | IIB | | |
| 39 | 820 | C | 10 | - | 2 | - | - | Y | Y | N | Y | Y | N | NR | N | N | - | Turbid | Use of pvt wells | III | | |
| 40 | ( 200)* | C | 8 | - | 2 | - | 0.007 | Y | Y | N | Y | N | N | NR | N | N | N | N | N | LNR | | |
| 41 | 500 | C | 9 | 2 | 2 | - | 0.200 | Y | Y | N | Y | N | N | Y | N | C,S F | More Help | N | - | IIA | | |
| 43 | 1,400 | C | 8 | - | 2 | - | 0.140 | Y | Y | N | Y | Y | N | NR | N | N | - | Turbid | Use of pvt wells | III | | |
| 46 | 60 | C | 8 | - | 1 | - | 0.009 | Y | Y | N | N | Y | N | NR | N | N | N | N | N | LNR | | |
| 47 | 150 | C | 10 | - | 2 | - | -- | Y | Y | N | N | N | N | NR | N | N | N | N | N | LNR | | |
| 49 | 240 | S | 8 | - | 2 | - | 0.010 | Y | Y | N | N | Y | N | NR | N | N | N | N | N | LNR | | |

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-S

| Code S- | Population Served | Ownership | Total Samples-CWSS | Source |  |  | Average Day MGD | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections |  | Chlorination | Fluoridation | Additional Treatment | Complaints |  |  | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  | S | G | O |  |  |  |  |  | Code | Prog |  |  |  | Oper | Cust | Mang |  | NYS | PHS |
| 50 | 450 | C | 7 | - | 2 | - | 0.050 | Y | Y | N | N | N | N | NR | N | N | N | N | N | LNR |  |  |
| 51 | ( 500)* | C | 8 | - | 1 | - | - | Y | Y | - | Y | N | N | NR | N | N | - | Rust | - | LNR |  |  |
| 54 | 3,500 | C | 10 | - | 7 | - | - | Y | Y | N | Y | Y | N | NR | N | N | N | Rust | - | LNR |  |  |
| 57 | (4,000)* | C | 8 | - | 1 | - | 0.070 | Y | Y | N | Y | N | N | Y | N | C | Main Breaks | Main Breaks | - | IIIB |  |  |
| 59 | 2,100 | C | 12 | - | 3 | - | 0.167 | Y | Y | N | Y | Y | N | NR | N | N | Pvt Wells | Turb | Pvt Wells | III |  |  |
| 61 | ( 900)* | C | 8 | - | 2 | - | - | Y | Y | N | Y | N | N | NR | N | N | N | N | N | LNR |  |  |
| 64 | 155 | S | 9 | - | 1 | - | - | Y | Y | N | N | N | N | NR | N | N | N | N | N | LNR |  |  |
| 65 | 600 | C | 8 | - | 2 | - | 0.051 | Y | Y | N | N | Y | N | NR | N | N | Pay | N | N | LNR |  |  |
| 66 | (1,500)* | C | 8 | - | 1 | - | 0.090 | Y | Y | N | Y | N | N | NR | N | C | Need new well | Rust | - | LR |  |  |
| 67 | 2,100 | C | 8 | - | 2 | - | 0.160 | Y | Y | N | Y | Y | N | NR | N | N | Pvt Wells | Cost Turb | Pvt Wells | III |  |  |

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

### TABLE 2-S

| Code S- | Population Served | Ownership | Total Samples-CWSS | Source |  |  | Average Day MGD | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections |  | Chlorination | Fluoridation | Additional Treatment | Complaints |  |  | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  | S | G | O |  |  |  |  |  | Code | Prog |  |  |  | Oper | Cust | Mang |  | NYS | PHS |
| 68 | 250 | C | 8 | - | 3 | - | - | Y | Y | N | N | N | N | NR | N | N | Press | Press Rust | No Help | LNR |  |  |
| 69 | 500 | C | 10 | - | 4 | - | 0.040 | Y | Y | N | Y | Y | N | R | N | N | - | Dirt | - | LNR |  |  |
| 70 | 900 | C | 8 | - | 7 | - | - | Y | Y | N | N | N | N | NR | N | N | N | N | N | LNR |  |  |
| 71 | 600 | C | 6 | - | 1 | - | - | Y | Y | N | N | N | N | NR | N | N | - | Rust | - | LR |  |  |
| 72 | 2,600 | C | 10 | - | 3 | - | 0.118 | Y | Y | N | N | N | N | NR | N | N | Unable to attend short course | Cost Rust Press | Lack Funds | LNR |  |  |
| 74 | ( 400)* | C | 10 | - | 2 | - | 0.070 | Y | Y | N | N | Y | N | NR | N | C | N | N | N | LR |  |  |
| 75 | 206 | C | 8 | - | 2 | - | - | Y | Y | N | N | Y | N | NR | N | N | N | N | N | LNR |  |  |
| 77 | 3,200 | C | 6 | - | 2 | - | 0.313 | Y | Y | N | Y | Y | N | NR | N | N | - | N | - | LNR |  |  |
| 78 | 1,400 | C | 9 | - | 2 | - | 0.085 | Y | Y | N | Y | Y | N | NR | N | N | - | N | - | LR |  |  |
| 79 | 360 | M | 8 | - | 2 | - | 0.015 | Y | Y | N | N | Y | N | NR | N | N | N | N | N | LNR |  |  |

## SUMMARY OF CWSS INVENTORY DATA FOR NYSMSA

## TABLE 2-S

| Code S- | Population Served | Ownership | Total Samples-CWSS | Source | | | Average Day | Approved Laboratory | Chem Analysis | Rad Analysis | Sanitary Survey | Cross-Connections | | Chlorination | Fluoridation | Additional Treatment | Complaints | | | Operator Licensing | Annual Bact Sampling Frequency Meets Requirements | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S | G | O | MGD | | | | | Code | Prog | | | | Oper | Cust | Mang | | NYS | PHS |
| 80 | 300 | C | 8 | - | 1 | - | 0.030 | Y | Y | N | N | N | N | NR | N | C,F,I | N | Rust | N | LR | | |
| 81 | ( 180)* | C | 6 | - | 1 | - | - | Y | N | N | N | N | N | NR | N | N | N | Brackish Taste | N | LNR | | |
| 82 | 320 | C | 4 | - | - | 1 | 0.020 | Y | Y | N | N | N | N | NR | N | N | N | N | N | LNR | | |
| 83 | 1,200 | C | 6 | - | 4 | - | 0.096 | Y | Y | N | Y | Y | N | R | N | N | - | Cloudy | - | II | | |
| 86 | 150 | C | 8 | - | 1 | - | 0.022 | Y | Y | N | Y | N | N | Y | N | N | - | Press Rust | Tax | LR | | |
| 88 | 1,200 | S | 8 | - | 2 | - | - | Y | Y | N | N | N | N | Y | N | N | N | T&O | N | LR | | |
| 89 | 2,540 | S | 6 | - | 2 | - | 0.170 | Y | Y | N | N | N | N | NR | N | C | N | N | N | LR | | |
| 90 | 14,000 | S | 13 | - | 6 | - | 2.000 | Y | Y | N | N | N | N | R | N | C | N | Rust | N | LR | | |
| 91 | 9,100 | S | 9 | - | 4 | - | 1.500 | Y | Y | N | Y | N | N | Y | N | C | Need Help | N | - | LR | | |
| 92 | 9,425 | S | 8 | - | 6 | - | 1.133 | Y | Y | N | N | N | N | NR | N | N | N | N | N | LR | | |
| 93 | ( 60)* | C | 3 | - | 1 | - | - | N | N | N | N | N | N | NR | N | N | N | N | N | LNR | | |

## TABLE 3-S

### VALUES EXCEEDING DRINKING WATER STANDARDS
(Based on Community Water Supply Study Sampling Only)

| Code S- | Constituents | Finished Water 1 | Finished Water 2 | Distribution System 1 | Distribution System 2 | Distribution System 3 | | Number of Samples |
|---|---|---|---|---|---|---|---|---|
| 1 | Mn(0.05) | 0.184 | 0.000 | 0.153 | 0.025 | 0.002 | | |
| 2 | Turb(5) | 5.70 | | | | | | |
| 2 | Color(15) | 25.0 | | | | | | |
| 3 | TDS(500) | 524.0 | | | | | | |
| 4 | Fe(0.3) | 0.031 | | 2.22 | 0.007 | 0.045 | | |
| 6 | Fe(0.3) | 0.215 | | 0.372 | 1.64 | | | |
| | Turb(5) | 7.80 | | | | | | |
| | Color(15) | 35.0 | | | | | | |
| 7 | Fe(0.3) + | 0.594 | | 0.120 | 0.223 | 0.263 | | |
| 9 | Fe(0.3) | 1.19 | 0.15 | 0.42 | | | | |
| | | 0.75 | | | | | | |
| | Mn(0.05) | 0.448* | 0.010 | 0.015 | | | | |
| | | 0.013 | | | | | | |
| | Cu(1.0) + | 0.007 | 0.036 | 1.18 | | | | |
| | | 0.212 | | | | | | |
| | CAM(200) | 255 | | | | | | |
| 11 | Fe(0.3) | 0.227 | | 0.664 | 0.333 | | | |
| | Turb(5) | 9.50 | | | | | | |
| 13 | Fe(0.3) + | 0.377 | | 0.057L | 0.188NH | | | 5 |
| 15 | Turb(5) | 8.50 | | | | | | |
| 20A | Fe(0.3)s + | 0.403 | 0.062 | 0.384 | 0.317 | 0.35 | 0.150 | |
| | Mn(0.05) | 0.165 | 0.008 | 0.205 | 0.250 | 0.053 | 0.006 | |
| 20B | Fe(0.3)s | 0.485 | 0.085 | 0.450 | 0.494 | 0.364 | 0.315 | 12 |
| | | 0.123 | 0.236 | | | 0.451 | | |
| | | | | | 0.146L | 0.319NH | | |
| | Mn(0.05) | 0.003 | 0.007 | 0.069 | 0.082 | 0.058 | 0.089 | 12 |
| | | 0.001 | 0.006 | | 0.008L | 0.051NH | | |
| 20C | Fe(0.3)s | 0.19 | 0.031 | 0.464 | 0.017L | 0.261NH | | 13 |
| | | 0.126 | | | | | | |
| | Mn(0.05) | 0.271 | 0.032 | 0.054 | 0.002L | 0.032NH | | 13 |
| | | 0.032 | | | | | | |
| 20F | Fe(0.3) | 0.016 | 0.034 | 0.728 | 0.013L | 0.038NH | | 6 |
| 20G | Fe(0.3) | 0.045 | 0.185 | 0.449 | 0.016L | 0.296NH | | 9 |
| | Mn(0.05) | 0.096 | 0.002 | 0.074 | 0.086 | 0.072 | | 9 |
| | | | | | 0.004L | 0.010NH | | |
| | Cu(1.0) | 0.107 | 0.207 | 1.20 | 0.010L | 0.123NH | | 9 |
| 20K | Fe(0.3) | 0.101 | | 0.797 | 0.077 | | | |

Finished Water - as delivered to distribution system, treated or untreated

| | | | |
|---|---|---|---|
| + | Average of samples did not exceed standard | | |
| ( ) | Public Health Service, Drinking Water Standards | | |
| M | Mandatory Standard | | |
| ____ | Exceeds Standard | | |
| L | Lowest sample value | NH | Next highest sample value |
| s | Sequestering iron | * | Exceeds New York Standard of 0.3 ppm Manganese |

| Code S- | Constituents | Finished Water 1 | Finished Water 2 | Distribution System 1 | Distribution System 2 | Distribution System 3 | Number of Samples |
|---|---|---|---|---|---|---|---|
| 21 | Fe(0.3) + | 0.719 | | 0.060 | 0.013 | | |
| 22 | Mn(0.05) | 0.092 | | 0.097 | | | |
| 23 | Fe(0.3) + | 0.053 | 0.134 | 0.67 | 0.043 | | |
| | Mn(0.05)+ | 0.004 | 0.005 | 0.061 | 0.004 | | |
| | Zn(5.0) + | 0.051 | 0.048 | 7.42 | 0.027 | | |
| 24 | Fe(0.3) | 0.144 | | 0.759 | | | |
| | $NO_3$(45) | 49.4 | | | | | |
| 27 | Cu(1.0) + | 0.090 | 0.149 | 1.65 | 0.221 | | |
| 35 | Cu(1.0) | - | | 2.00 | 2.55 | | |
| 37 | Fe(0.3) | 0.530 | | 0.537 | 0.440 | | |
| 38 | Turb(5) | 23.0 | | | | | |
| | Color(15) | >100 | | | | | |
| 39 | Cu(1.0) + | 0.151 | 0.161 | 1.40 | 0.228 | | |
| 40 | Fe(0.3) + | 0.409 | | 0.227 | 0.220 | | |
| | Mn(0.05) | 0.226 | | 0.183 | 0.155 | | |
| 46 | M-Coli(1) | 12 | | 0 | 0 | | |
| 47 | Fe(0.3) | - | | 1.88 | 0.357 | 0.141 | |
| | Mn(0.05) | - | | 0.077 | 0.082 | 0.086 | |
| 51 | Fe(0.3) | 0.615 | | 0.426 | 0.022 | | |
| 54 | Fe(0.3) | 3.33 | 0.038 | | | | |
| | | 0.134 | 0.018 | | | | |
| 57 | Fe(0.3) + | | | 0.371 | 0.270 | 0.277 | |
| 59 | Fe(0.3) + | 0.340 | 0.039 | 0.056 | 0.112 | | |
| | | 0.014 | | | | | |
| 61 | Fe(0.3) | 1.03 | | 0.325 | 0.194 | | |
| | Turb(5) | 7.30 | | | | | |
| | Color(15) | 45.0 | | | | | |
| 65 | Mn(0.05) | 0.072 | | 0.057 | 0.058 | | |
| 66 | Fe(0.3) | 0.543 | | 7.25 | 0.440 | | |
| 69 | Fe(0.3) | 0.021 | 0.020 | 2.01 | 0.078 | | |
| 70 | Mn(0.05) | 0.341* | | 0.481* | 0.255 | | |
| 71 | Fe(0.3) + | - | | 0.373 | 0.226 | | |
| 72 | Fe(0.3) + | - | | 0.596 | 0.272 | 0.082 | |
| 74 | Fe(0.3) + | 0.027 | 0.039 | 0.427 | 0.355 | | |
| 75 | Mn(0.05)+ | 0.000 | | 0.056 | 0.039 | | |
| 80 | Fe(0.3) + | 0.700 | | 0.076 | 0.232 | | |
| 81 | Zn(5.0) + | - | | 6.47 | 0.048 | | |
| | TDS(500) | 1675.2 | | | | | |
| | Chlor(250) | 920.0 | | | | | |
| 83 | Fe(0.3) | | | 1.24 | 0.156 | | |
| | M-Pb(0.05) | | | 0.128 | 0.013 | | |
| | M-Cd(0.01) | | | 3.94 | 0.002 | | |
| 86 | Fe(0.3) | 0.654 | | 2.40 | 1.34 | | |
| 88 | Mn(0.05) | 0.120 | | 0.111 | 0.110 | | |
| 91 | Fe(0.3) + | 0.010 | | 0.492 | 0.33 | 0.196 | |
| | | 0.242 | 0.043 | | | | |

## SUMMARY OF SUPPLIES WITH CONSTITUENTS EXCEEDING STANDARDS AND OTHER DEFICIENCIES

| SYSTEM S- | CONSTITUENTS Recommended | CONSTITUENTS Mandatory | OTHER* |
|---|---|---|---|
| 1 | Mn | | A |
| 2 | Turb, Color | | A |
| 3 | TDS | | ABCDF |
| 4 | Fe | | A |
| 5 | | | A |
| 6 | Turb, Color, Fe | | A |
| 7 | Fe | | A |
| 8 | | | A |
| 9 | Cu, Fe, Mn, CAM | | AD |
| 10 | | | A |
| 11 | Turb, Fe | | A |
| 13 | Fe | | ABC |
| 14 | | | AB |
| 15 | Turb | | A |
| 16 | | | A |
| 17 | | | A |
| 18 | | | B |
| 19 | | | A |
| 20 | Fe, Cu, Mn | | A (Chem) E |
| 21 | Fe | | A |
| 22 | Mn | | AD |
| 23 | Fe, Zn, Mn | | A |
| 24 | Fe, $NO_3$ | | A |

* KEY

A- System is not complying with the requirements of the County Health Department as set forth in its letter of January 20, 1969 relative to bacteriological and chemical sampling. See attached letter.
B- System is treating water without a licensed operator.
C- System is not complying with County Health Department's Orders relative to chlorination or other treatment.
D- Conditions of water system facilities as observed by the Public Health Service engineer during the CWSS received unfavorable comment.
E- Laboratory testing water samples has not received State approval.
F- County data indicates a record of high bacterial results.

| SYSTEM S- | CONSTITUENTS Recommended | CONSTITUENTS Mandatory | OTHER* |
|---|---|---|---|
| 25 | | | A |
| 27 | Cu | | A |
| 28 | | | AB |
| 29 | | | A |
| 33 | | | A |
| 34 | | | A |
| 35 | | | AD |
| 36 | | | A |
| 37 | Fe | | A |
| 38 | Turb, Color | | A |
| 39 | Cu | | A |
| 40 | Fe, Mn | | AD |
| 41 | | | A |
| 43 | | | A |
| 46 | | Coli | A |
| 47 | Fe, Mn | | A |
| 49 | | | A |
| 50 | | | A |
| 51 | Fe | | AC |
| 54 | Fe | | A |
| 57 | Fe | | A |
| 59 | Fe | | A |
| 61 | Fe, Turb, Color | | A |
| 64 | | | A |
| 65 | Mn | | A |
| 66 | Fe | | A |
| 67 | | | A |
| 68 | | | A |
| 69 | Fe | | ACDF |
| 70 | Mn | | A |
| 71 | Fe | | AB |
| 72 | Fe | | A |
| 74 | Fe | | A |
| 75 | Mn | | A |
| 77 | | | A |
| 78 | | | A |
| 79 | | | A |
| 80 | Fe | | AB |
| 81 | Zn, TDS, Chlorides | | A |
| 82 | | | A |
| 83 | Fe | Pb, CD | ACF |
| 86 | Fe | | AB |
| 88 | Mn | | AD |
| 89 | | | AB |
| 90 | | | ABC |
| 91 | Fe | | ABD |
| 92 | | | ABC |
| 93 | | | A |

SUFFOLK COUNTY
DEPARTMENT OF HEALTH
SUFFOLK COUNTY CENTER
RIVERHEAD, NEW YORK 11901

DIVISION OF ENVIRONMENTAL
HEALTH SERVICES
HERBERT W. DAVIDS, P.E.
DIRECTOR

January 20, 1969

Dear Sir:

Part 5 of the New York State Sanitary Code specifies the statutory requirements for operation of public water supplies. An item of special importance to Suffolk County is contained in Section 5.30 and relates to Water Quality and Protection. This section defines the responsibility of the owner or persons in charge of a public water supply to arrange for the sampling and analysis of the source and distributed waters of the supply for bacteriological, physical, and chemical quality.

The requirements of this part of the code are in general poorly conformed with in Suffolk County. However, our increasing population coupled with the continued employment of cesspools as our only means of waste disposal emphasize the need for an intensification of ground water quality surveillance. Accordingly, you are requested to take the following measures to comply with water quality examination in your supply:

1. Collect and analyze quarterly samples for the bacteriological quality of the rain water source (each well prior to any treatment procedure).
2. Collect from the distribution system and analyze monthly samples for bacteriological quality. The number of monthly samples shall be in accordance with the graph in Chapter 5.
3. Collect and analyze for chemical quality an annual sample from each supply well. Such samples should be collected when the well is in frequent use. The analysis shall be made for the following constituents: Iron, Manganese, Carbon Dioxide, Ammonia, Nitrite, Nitrate, Chloride, Hardness, Alkalinity, Total Solid, ABS, Specific Conductivity.
4. Collect and analyze for chemical quality two samples per year at six-month intervals from the distribution system. The analyses shall be for the constituents listed under (3) above.
5. The laboratories in which the examinations are made shall be approved for such examinations by the New York State Health Department.
6. The results of all analyses shall be forwarded to the Suffolk County Health Department by the laboratory which performs the analysis.

7. Submit copies of all the results of previous chemical analyses made on your wells or distribution systems to the Suffolk County Health Department. The Department wishes to computerize this information in order to determine water quality trends within the county.

Since Part 5 of the New York State Sanitary Code has been in effect since March 15, 1967, these requirements are effective immediately.

Thank you for your cooperation in this matter of mutual concern. If you have any questions, please call.

Very truly yours,

John M. Flynn

John M. Flynn, P.E.
Associate Public Health Engineer
Water Resources Unit

JMF/gph

SUFFOLK COUNTY

**EXCERPT FROM CROSS-CONNECTION CONTROL REPORT**
Terrance L. Campbell, PHS Engineer

Code
S-

20 Suffolk County Water Authority, Oakdale, New York

| | |
|---|---|
| Population Served | 620,880 |
| Number of establishments visited | 3 |
| Number of hazards observed-Total | 7 |
| Hospital | 6 |
| Sewage Treatment Plant | 1 |
| Metal Plating Plant | 0 |

This particular supply is quite unique in its rate of growth. Many customers formerly utilizing private wells are rapidly being included in the water authority service area. As a result, interconnections with these wells is a recognized hazard and an inspection usually precedes each new connection. The water authority has rules and regulations forbiding any interconnections but maintains no program to enforce them on a continuing basis. County health authorities involved in this survey expressed the need for increased activity in cross-connection control. None of the municipal plumbing inspection authorities within Suffolk County were contacted. More emphasis is required particularly in those facilities not inspected by other authorities.

# APPENDIX E

## NEW YORK STATE DEPARTMENT OF HEALTH

New York State

In New York State the responsibility for public drinking water supplies lies in the Department of Health. Two sections handling comprehensive planning and design facilities for water supplies are in the Bureau of Engineering Design. Responsibility for operation and performance of existing water supplies for compliance with the State Drinking Water Standards resides with the Water Works Section in the Bureau of Water and Waste Utilities Management. At the time of the Community Water Supply Study this section employed seven engineers, one secretary and two typists.

There are approximately 1,700 public water supplies in the State of New York. About 1,100 supplies have their own sources, while the remaining supplies purchase their water and provide treatment and distribution service or both. Records show about 640 supplies are providing some degree of treatment. About 160 have filters such as rapid or slow sand, pressure or anthrafelt.

In order to cover the state, the Health Department has six regional offices. The four counties in the New York Standard Metropolitan Statistical Area are covered by the White Plains office in Westchester, while a separate office in New York City is responsible for the city.

Presently the main state laboratory is in Albany with one regional laboratory in operation serving the mid-state area. Future plans call for a total of five regional laboratories. While these laboratories will provide surveillance, like the present facilities, they will also have the expertise for carrying out tests for which local county, municipal, etcetera, facilities are not equipped.

The New York State Drinking Water Standards are patterned after the Public Health Service standard with the exception of manganese and minimum number of bacteriological samples per month curve.

The Water Works Section has initiated the use of a new form 255 for which the Public Health Service Interstate Carrier Water Supply form 682 served as a basis. As with the 682, this new form will be filled in annually by all water supplies in New York State. The Section also does surveys and reports on supplies similar to but more detailed than the ICWS program.

The following is a partial list of publications prepared by the Health Department:

1. Manual of Instructions for Water Treatment Plant Operators
2. Tests for Free Chlorine Residual in the Control of Water Treatment - Bulletin 33
3. Water Supply Control, Bulletin 22
4. Fluoridation of Public Water Systems - Requirements and Procedures
5. Fluoridation of Public Waters in New York State - 1968 - Status, Design, Considerations, Safety and Costs

CWSS-II

# STATE OF NEW YORK

## ADMINISTRATIVE RULES AND REGULATIONS

## PART 72

# DRINKING WATER STANDARDS

(Statutory Authority: Public Health Law, §§ 201, 1100)

Sections 72.1 through 72.6

# PART 72

## DRINKING WATER STANDARDS

(Statutory authority: Public Health Law, §§ 201, 1100)

Sec.
72.1 Sampling requirements
72.2 Analytical methods
72.3 Bacteriological characteristics
Sec.
72.4 Physical characteristics
72.5 Chemical characteristics
72.6 Biological organisms

### Historical Note

Part (§§ 72.1-72.6) added, filed Nov. 27, 1964 to be eff. Nov. 27, 1964.

**Section 72.1 Sampling requirements.** Compliance with the drinking water standards shall be determined by examinations of properly collected samples submitted to a laboratory approved for the purpose by the State Commissioner of Health. The number and type of samples examined from a drinking water supply shall be in accordance with a sampling program approved or as directed by the State Department of Health.

### Historical Note

Sec. added, filed Nov. 27, 1964 to be eff. Nov. 27, 1964.

**72.2 Analytical methods.** Analytical methods to determine conformance with the requirements of these standards shall be those specified by the State Department of Health.

### Historical Note

Sec. added, filed Nov. 27, 1964 to be eff. Nov. 27, 1964.

**72.3 Bacteriological characteristics.** (a) Samples from a chlorinated drinking water supply submitted for bacteriological examination shall be collected in sterile containers containing a dechlorinating agent. The coliform group of bacteria includes all organisms considered in the coliform group as set forth in *Standard Methods for the Examination of Water and Waste Water*, current edition, prepared and published jointly by the American Public Health Association, American Water Works Association, and Water Pollution Control Federation. The standard sample for the bacteriologic tube dilution technic for the presence of coliform group bacteria shall consist of at least five 10-ml portions, one 1-ml portion, and one 0.1-ml portion. If records are available indicating that the 1.0-ml and 0.1-ml portions do not yield more than one positive tube in three consecutive months, these portions may be eliminated in future examinations of samples from the same supply. For the membrane filter technic for the enumeration of the coliform group, not less than 50-ml of sample shall be examined.

(b) To conform with the standards the number of organisms of the coliform group as indicated by the results of laboratory examination of samples shall not exceed the following values:

(1) The arithmetic average of the most probable number (MPN) per 100 ml of all samples examined in any month shall not exceed 1.1 coliform organisms per 100 ml of sample. A most probable number (MPN) per 100 ml of 8.8 or greater shall not occur in:

(i) two consecutive samples;

(ii) more than one sample per month when less than 20 are examined per month; or

(iii) more than five per cent of the samples when 20 or more are examined per month.

(2) The arithmetic average of the membrane filter count per 100 ml of samples examined in any month shall not exceed 1 coliform organism per 100 ml of sample. Coliform colonies per sample shall not exceed 3 per 50 ml, 4 per 100 ml, 7 per 200 ml, or 13 per 500 ml in:

(i) two consecutive samples;

(ii) more than one sample per month when less than 20 are examined per month; or

(iii) more than five per cent of the samples when 20 or more are examined per month.

**Historical Note**

Sec. added, filed Nov. 27, 1964 to be eff. Nov. 27, 1964.

**72.4 Physical characteristics.** To conform with these standards not more than two of the following values shall be exceeded in any single sample. The arithmetic average of all samples examined in any month shall not exceed any of the following:

turbidity, 5 units
color, 15 units
threshold odor, 3.

**Historical Note**

Sec. added, filed Nov. 27, 1964 to be eff. Nov. 27, 1964.

**72.5 Chemical characteristics.** (a) Drinking water shall not contain added or natural impurities in concentrations which may be hazardous to the health of the consumers, as determined by the State Commissioner of Health. It shall not be excessively corrosive to the water supply system. Substance which may have a deleterious physiological effect, or for which physiological effects are not known, shall not be introduced into the system in a manner which would permit them to reach the consumer. Substances used in treatment shall not remain in the water in concentrations greater than required by good practice.

(b) The presence of any of the following substances in an amount detectable by the specified laboratory determination shall require examination of additional samples as specified by the State Department of Health to determine the maximum concentration that might occur. To conform with these standards, the following values shall not be exceeded:

| *Substance* | *Concentration in mg/l* |
|---|---|
| Alkyl benzene sulfonate | 0.5 |
| Arsenic (As) | 0.05 |
| Barium (Ba) | 1.0 |
| Cadmium (Cd) | 0.01 |
| Carbon chloroform extract (CCE) | 0.2 |
| Chloride (Cl) | 250 |
| Chromium (hexavalent) ($Cr^{+6}$) | 0.05 |
| Copper (Cu) | 1.0 |
| Cyanide (CN) | 0.2 |
| Fluoride (F) | 1.50 |
| Iron (Fe) | 0.3 |
| Lead (Pb) | 0.05 |
| Manganese (Mn) | 0.3 |
| Nitrate (N) | 10 |
| Phenols | 0.001 |
| Selenium (Se) | 0.01 |
| Silver (Ag) | 0.05 |
| Sulfate ($SO_4$) | 250 |
| Total dissolved solids | 500 |
| Zinc (Zn) | 5 |

**Historical Note**

Sec. added, filed Nov. 27, 1964 to be eff. Nov. 27, 1964.

**72.6 Biological organisms.** Biological organisms shall not be allowed in drinking water in amounts sufficient to render the water unsafe or otherwise objectionable, as determined by the State Commissioner of Health.

**Historical Note**

Sec. added, filed Nov. 27, 1964 to be eff. Nov. 27, 1964.

# NEW YORK STATE SANITARY CODE

## PART 5

# Drinking Water Supplies

**(Statutory Authority: Public Health Law. § 225)**

**Sections 5.1 through 5.40**

# PART 5

## DRINKING WATER SUPPLIES

(Statutory authority: Public Health Law, § 225)

Sec.

GENERAL PROVISIONS

5.1 Definitions
5.2 Approval of plans and completed works
5.3 Reporting emergency changes
5.4 Approval of fluoridation
5.5 Disinfection

SOURCES OF WATER SUPPLIES

5.10 Protection and supervision
5.11 Sampling new sources of supply

WATER TREATMENT PLANTS

5.20 Providing treatment for public water supplies
5.21 Operation of a public water supply

Sec.

WATER QUALITY AND PROTECTION

5.30 Examination of samples of water
5.31 De-watering trenches
5.32 Adequacy of distribution system
5.33 Physical connections
5.34 Blow-off facilities
5.35 Protection of equalizing and distribution reservoirs
5.36 Pumping equipment

BOTTLED AND BULK WATER

5.40 Distribution of bottled or bulk water

### Historical Note

Part repealed, new added, filed Feb. 28, 1967 to be eff. Mar. 15, 1967.

### GENERAL PROVISIONS

**Section 5.1 Definitions.** (a) The term, *public water supply*, as used in this Part shall mean any drinking water supply system including the source, treatment works, transmission mains, distribution system and storage facilities serving the public. This term shall include a drinking water supply for a group of five or more dwelling units, a temporary residence, school, institution, factory, industrial plant or place frequented by the public, other than a household.

(b) The term, *dwelling unit*, shall mean one or more rooms with provision for living, sanitary and sleeping facilities arranged for the use of one family.

(c) The term, *drinking water supply*, shall mean water available for human consumption, food preparation or culinary purposes.

(d) The term, *source of water supply*, shall mean any ground water aquifer, surface water body or water course from which by any means water is regularly taken either periodically or continuously.

(e) The term, *auxiliary source of water supply*, shall mean a source of water supply which is not normally used but which has been approved by the Water Resources Commission or its predecessor as a source of water and developed for use when for any reason the normal source or sources fail to meet water supply requirements.

(f) The term, *emergency source of water supply*, shall mean a source of water which has not been developed and approved as a regular source of water and which is developed during an emergency for temporary use as a source of water in case of failure or inadequacy of the regular or auxiliary source of public water supply.

(g) The term, *water treatment plant*, shall mean any plant or equipment which, through the addition of chemicals or through aeration, ion exchange, demineralization, sedimentation or filtration, or through any other means or combinations of treatment, shall change the physical, chemical, radiological, biological or bacterial quality of the water.

(h) The term, *protection by natural means*, involves the processes of nature that produce water meeting requirements of Part 72 of the Administrative Rules and Regulations, entitled "Drinking Water Standards".

(i) The term, *protection by treatment*, means any one or any combination of the controlled processes of aeration, coagulation, sedimentation, adsorption, filtra-

(l) The term, *protection by treatment*, means any one or any combination of the controlled processes of aeration, coagulation, sedimentation, adsorption, filtration, disinfection, or other processes which produce a water meeting the requirements of Part 72 of the Administrative Rules and Regulations.

**Historical Note**

Sec. amd., filed Oct. 10, 1962; repealed, Mar. 15, 1967.
new added, filed Feb. 28, 1967 to be eff.

**5.2 Approval of plans and completed works.** (a) No owner or operator of a public water supply shall make, install or construct, or allow to be made, installed or constructed, a public water supply system or any addition to or modification of a public water supply which will or may affect the quality of the water or which may affect the adequacy of the supply to serve consumers, until the plans and specifications first shall have been submitted to and received the approval of the State Commissioner of Health.

(b) *Recommended Standards for Water Works**, as issued by the State Department of Health, shall be the basis upon which all plans and specifications for public water supplies will be reviewed for approval. Variations will be considered upon justification by the designing engineer.

(c) The State Commissioner of Health may grant approval of such plans or may require such modification as, in his opinion the public health or safety may require. Application for such approval shall be made on a form prescribed by and in accordance with the requirements of the State Commissioner of Health.

(d) No owner or operator of a public water supply shall place into service any works constructed under the requirements of this section until he has first applied to and received the approval of the State Commissioner of Health for the completed works.

**Historical Note**

Sec. amd., filed Oct. 10, 1962; repealed, Mar. 15, 1967.
new added, filed Feb. 28, 1967 to be eff.

**5.3 Reporting emergency changes in public water supplies.** (a) The person or persons in charge of any public water supply shall not take, use, or cause to be taken for use for public water supply purposes, water from any source other than the regular or auxiliary source or sources of public water supply, discontinue the chlorination or treatment of any public water supply or make any change whatsoever which may affect the quality of such water supply without first having notified by telephone or telegram, and received the approval of, the district State health officer, the county commissioner of health or the city commissioner of health having jurisdiction. Upon the receipt of such notification the district State health officer, the county commissioner of health or the city commissioner of health having jurisdiction shall in turn advise the local water supply officials and interested local health officers of action required to be taken or of the approval of the action proposed to be taken by the local water supply officials to protect the health of the consumers served by the water supply during the emergency.

(b) A printed copy of this section shall be kept constantly posted in the office used by the authorities owning or having charge of any such water supply.

**Historical Note**

Sec. repealed, new added, filed Feb. 28,
1967 to be eff. Mar. 15, 1967.

**5.4 Approval of fluoridation of drinking water supplies.** Fluorine compounds shall not be added to a public water supply until a written application has been submitted to and written approval is granted by the State Commissioner of Health.

**Historical Note**

Sec. repealed, new added, filed Feb. 28,
1967 to be eff. Mar. 15, 1967.

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* See Appendix 72-C.

**5.5 Disinfection of spring basins, collecting basins, wells, infiltration galleries, water mains and reservoirs.** No spring basin, collecting basin, well or infiltration gallery used as a source of public water supply, nor any main, standpipe, reservoir, tank or other pipe or structure through which water is delivered to consumers for potable purposes shall be placed in use after it has been constructed, cleaned or repaired until such structure or main has been disinfected in a manner approved by the State Commissioner of Health..

**Historical Note**

Sec. repealed, new added, filed Feb. 28, 1967 to be eff. Mar. 15, 1967.

**5.6 Disinfection of spring basins, collecting basins, wells, infiltration galleries, water mains and reservoirs.**

**Historical Note**

Sec. repealed, filed Feb. 28, 1967 to be eff. Mar. 15, 1967.

### SOURCES OF WATER SUPPLIES

**5.10 Protection and supervision of public water supplies.** The owner and the person or persons operating a public water supply shall exercise due care and diligence in the maintenance and supervision of all sources of public water supply so as to prevent their pollution and depletion insofar as possible.

**Historical Note**

Sec. repealed, new added, filed Feb. 28, 1967 to be eff. Mar. 15, 1967.

**5.11 Sampling new sources of public water supply.** No new permanent source of public water supply shall be placed in service until a sanitary survey has been made and water from said source has been examined and reported upon by the State Department of Health. A supply may be placed in service under either of the following conditions:

(a) If the sanitary survey indicates the source to be adequately protected by natural means and the water is reported to be of a quality satisfactory to the State Commissioner of Health.

(b) If the sanitary survey indicates the source to be inadequately protected by natural means or the quality of the water is not satisfactory, a treatment process has been instituted and the treated water is tested by the State Department of Health and written approval of the effectiveness of treatment has been issued by the State Commissioner of Health.

**Historical Note**

Sec. repealed, new added, filed Feb. 28, 1967 to be eff. Mar. 15, 1967.

### WATER TREATMENT PLANTS

**5.20 Providing treatment for public water supplies.** The owner of a public water supply shall provide such treatment facilities that the water delivered to consumers conforms to Part 72 of the Administrative Rules and Regulations. Minimum treatment for a water supply obtained in whole or in part from a surface water shall be disinfection, by chlorination or other method acceptable to the State Commissioner of Health.

**Historical Note**

Sec. repealed, new added, filed Feb. 28, 1967 to be eff. Mar. 15, 1967.

**5.21 Operation of a public water supply.** (a) The person or persons in charge of the operation of a public water supply shall operate and maintain the water supply system in such a manner as to produce a supply meeting the requirements of Part 72 of the Administrative Rules and Regulations.

(b) Complete daily records shall be kept of the operation of water supply systems on forms furnished or approved by the State Commissioner of Health. A copy of such records shall be forwarded to the State Commissioner of Health or his designated representative at monthly intervals, and shall be held available for inspection by the State Commissioner of Health or his designated representative, as he may prescribe.

(c) Every owner of a water treatment plant shall provide laboratory facilities satisfactory to the State Commissioner of Health. Tests for the control of the operation of such treatment plant shall be made daily or more frequently if required. The results of such tests shall be recorded on forms furnished or approved by the State Commissioner of Health and forwarded to him or to his designated representative at monthly intervals.

**Historical Note**

Sec. repealed, new added, filed Feb. 28, 1967 to be eff. Mar. 15, 1967.

## WATER QUALITY AND PROTECTION

**5.30 Examination of samples of water.** The number and type of samples, frequency and points of sampling shall be in accordance with a sampling program approved or as directed by the State Commissioner of Health.

(a) (1) It shall be the responsibility of the owner or the person or persons in charge of the operation of a public water supply to arrange for the sampling and analysis of the source and distributed waters of the supply for bacteriological, physical and chemical quality. Minimum sampling shall be in accordance with the schedule set forth herein or as modified by the State Commissioner of Health. In determining the number of samples examined, the following samples may be included, provided all results are assembled and available for inspection and the laboratory methods and technical competence of the laboratory personnel are satisfactory to the State Commissioner of Health:

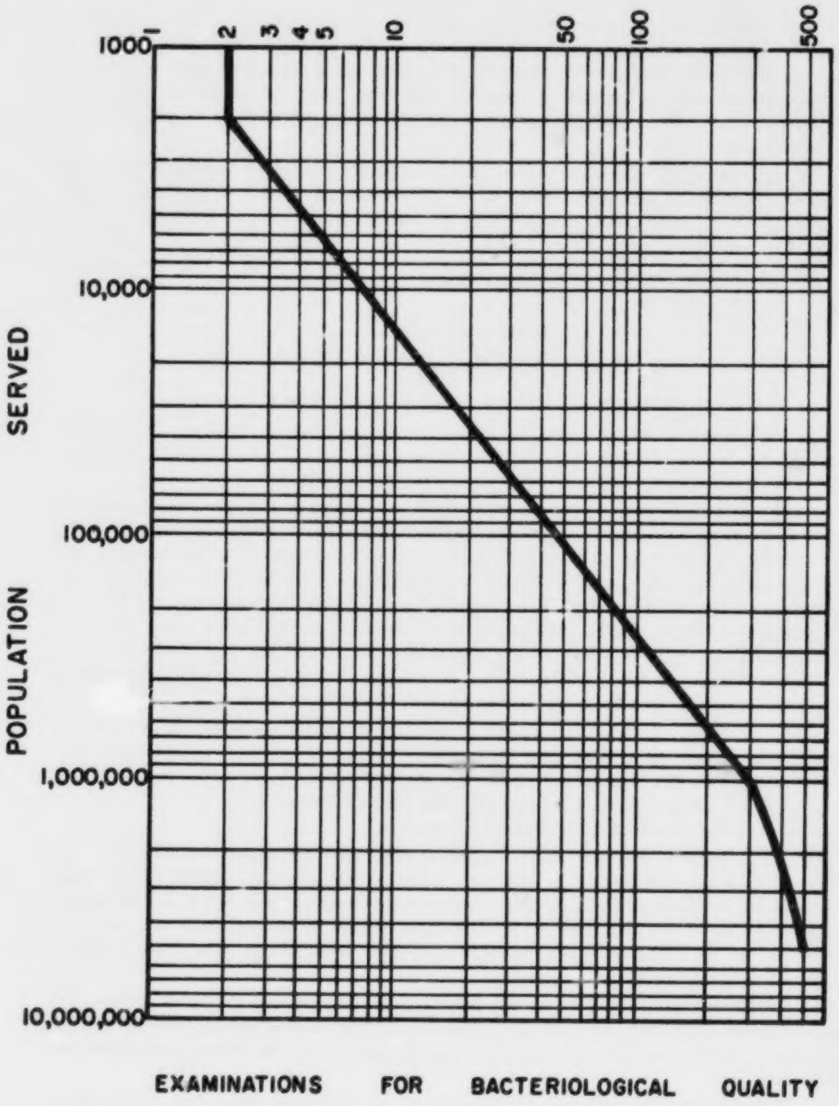
— samples examined by a water treatment plant operator, or a chemist employed by a public water supply;
— samples examined by commercial laboratories;
— samples examined by local government laboratories;
— samples examined by State laboratories.

(2) The laboratories in which these examinations are made and the methods used in making them shall be subject to inspection at any time by the State Commissioner of Health. Only the laboratory procedures set forth in the latest edition of the American Public Health Association Standard Methods for the Examination of Water and Waste-water, or those specified by the State Department of Health, shall be acceptable.

(3) The untreated waters of the source shall be sampled to characterize raw water bacteriological quality at the following minimum frequency: ground water, quarterly; surface waters, biweekly; or as prescribed by the State Commissioner of Health.

(4) The minimum number of samples to be collected from the distribution system and examined each month for bacteriological quality shall be in accordance with the number of the graph included herein for the population served by the system. Scheduling of samples must be distributed in time and the location must be representative of water quality available to the consumer. For populations under 1,000, the minimum number of samples shall be one each month, or as prescribed by the State Commissioner of Health.

MINIMUM NUMBER OF SAMPLES
PER MONTH



(5) Chemical analyses to characterize the sanitary quality of the water and the presence of certain mineral constituents shall be performed periodically. The specific tests shall be prescribed by the State Commissioner of Health. The untreated waters of the source shall be sampled at the following minimum frequency: ground water, annually; surface waters, semiannually. The minimum number of samples to be collected from the distribution system and examined for chemical analyses shall be two per year at six-month intervals; or as required by the State Commissioner of Health.

(6) If any substance listed in Part 72 of the Administrative Rules and Regulations is found to approach the maximum permissible concentration, the State Commissioner of Health may require routine sampling and examination for that constituent at a prescribed frequency.

(7) The untreated waters of the source shall be sampled to characterize the physical quality of the water as to turbidity and color at the following frequency: ground water, annually; surface waters, weekly; or as required by the State Commissioner of Health.

(8) The minimum number of samples to be collected from the distribution system and examined for physical quality shall be one each day that the required samples are collected for bacteriological analysis; or as required by the State Commissioner of Health.

(b) Additional samples of water shall be collected from the source and distribution system of each public water supply by the person or persons in charge, as may be required by the State Commissioner of Health or as may be considered necessary by the persons in charge, to assure adequate control of the sanitary quality of the supply and to measure conformance with Part 72 of the Administrative Rules and Regulations.

(c) The State Department of Health may arrange for collection of samples of water from public water supplies and for their examination in a laboratory approved by the State Commissioner of Health.

**Historical Note**

Sec. repealed, new added, filed Feb. 28, 1967 to be eff. Mar. 15, 1967.

**5.31 De-watering trenches.** No repairs to distribution systems of public water supplies shall be made until those portions of the trenches containing the mains, valves or other structures being repaired have been de-watered to a point below the mains, valves or other structures, and every effort made to prevent the entrance of foreign material and seepage into such mains, valves or other structures.

**Historical Note**

Sec. repealed, new added, filed Feb. 28, 1967 to be eff. Mar. 15, 1967.

**5.32 Adequacy of distribution system.** The water supply distribution system including pumping equipment, supply mains, distribution system, water storage facilities, and other related works, shall be so constructed, maintained and operated by the owner as to continuously assure a minimum working pressure of 20 pounds per square inch under all flow requirements of the distribution system.

**Historical Note**

Sec. repealed, new added, filed Feb. 28, 1967 to be eff. Mar. 15, 1967.

**5.33 Physical connections.** No owner of a public water supply shall permit any physical connection between the distribution system or other structure of such supply containing drinking water and any other water supply system, drain, sewer, sewer flush tank, siphon manhole, pipe, open tank, pressure tank, sump or vat, or other structure which contains liquids, chemicals, water of unsafe, unsatisfactory or unknown quality, sewage or any other contaminating substances, except under the following conditions:

(a) When the separate water supply is regularly examined as to its quality by those in charge of the public water supply to which the connection is to be made and is found to be of a quality satisfactory to the State Commissioner of Health and approval has been given by the person or persons in charge of the public water supply to the owner of the separate supply authorizing the maintenance of the connection. A copy of such approval and one set of the plans for such connection shall be filed with the State Commissioner of Health.

(b) When the water from the public water supply is discharged into an elevated tank, suction tank, sump or pit above the elevation of the maximum water level of such tank, sump or pit to which water of unsatisfactory quality is also discharged. Such tank, sump or pit shall be open to atmospheric pressure. Such elevated tank, suction tank, sump or pit shall be inspected at least annually by persons in charge of the public water supply and records of such inspections shall be maintained by the persons in charge of the public water supply.

(c) When special adjustable pipe connections or other protective devices are provided and so arranged that water cannot be secured simultaneously from both the public water supply and a separate supply of unsatisfactory quality nor flow from the separate supply to the public water supply, provided an application and plans for such special connections are submitted to and receive the approval of the person or persons in charge of the public water supply and of the State Commissioner of Health. All such adjustable pipe connections or other protective devices shall be inspected at least annually by persons in charge of the public water supply and a record of such inspection shall be maintained.

(d) When sprinkler systems or piping systems serving fire hydrants used exclusively for fire protection purposes are connected to a public water supply system and also to the pressure system of a fire pump taking suction from a separate supply which is unsatisfactory without treatment, but which has been approved for the purpose by the State Commissioner of Health, provided that the separate water supply system is equipped with a special fire pump chlorinator, and check valves of a design approved by the State Commissioner of Health, an application and plans for which shall be submitted to and receive approval by a responsible person in charge of the public water supply and by the State Commissioner of Health. Such check valves shall be examined and tested for leakage at specified intervals as noted in the certificate of approval. Records of such tests and of the daily operation of the fire pump chlorinator shall be maintained and submitted at monthly intervals to the person or persons in charge of the public water supply and to the State Commissioner of Health. The person or persons in charge of the public water supply, or their designated representatives, shall inspect the fire pump chlorinator at least monthly and records of such inspections shall be maintained.

(e) When the connection is installed and protected in a manner satisfactory to the State Commissioner of Health so as to prevent the pumpage, drainage, backflow or siphonage of liquids, chemicals, unsafe or otherwise unsatisfactory water, sewage or any other contaminating substance into the drinking water supply system.

**Historical Note**

Sec. repealed, new added, filed Feb. 28, 1967 to be eff. Mar. 15, 1967.

**5.34 Blow-off facilities.** All blow-off drains or discharge pipes connected to distribution systems of public water supplies shall be terminated at points where these structures will not be subject to flooding or otherwise subject to contamination by sewage or surface water.

**Historical Note**

Sec. added, filed Feb. 28, 1967 to be eff. Mar. 15, 1967

**5.35 Protection of equalizing and distribution reservoirs.** The reservoirs utilized for the storage of water of a public water supply which will be delivered to the public without subsequent treatment, shall be covered. The water from an uncovered reservoir must be effectively disinfected by chlorination or other methods acceptable to the State Commissioner of Health before being discharged into a public water supply distribution system.

**Historical Note**

Sec. added, filed Feb. 28, 1967 to be eff. Mar. 15, 1967.

**5.36 Pumping equipment.** Equipment used for the pumping of a public water supply, which is not subject to subsequent treatment, shall be so installed and operated as to prevent flooding by surface water and exposure of the suction pipe to polluted water. Whenever priming is necessary, such pump shall be primed with water of a quality satisfactory to the State Commissioner of Health.

**Historical Note**

Sec. added, filed Feb. 28, 1967 to be eff. Mar. 15, 1967.

### BOTTLED AND BULK WATER

**5.40 Distribution of bottled or bulk water.** No person shall sell, offer for sale or deliver water for human consumption, food preparation or culinary purposes unless the source, equipment, treatment, and method of handling are approved by the State Commissioner of Health. This provision shall apply also to the distribution of water in containers or by bulk tank transportation.

**Historical Note**

Sec. repealed, new added, filed Feb. 28, 1967 to be eff. Mar. 15, 1967.

**5.41 Certain interconnections prohibited.**

**Historical Note**

Sec. repealed, filed Feb. 28, 1967 to be eff. Mar. 15, 1967.

# NEW YORK STATE DEPARTMENT OF HEALTH
DIVISION OF PURE WATERS
BUREAU OF WATER AND WASTEWATER UTILITIES MANAGEMENT
WATER WORKS SECTION

## SUMMARY OF ANNUAL INSPECTION OF PUBLIC WATER SUPPLY

FOR USE OF CENTRAL OFFICE
1 ☐☐☐☐ 4 5 ☐☐ 6 7 ☐☐ 8
Sequence County DB

MUNICIPALITY, WATER DISTRICT, COMPANY, ETC.

CITY, TOWN, VILLAGE COUNTY

WATER WORKS IN CHARGE OF

NAME OF CHIEF OPERATOR

DATE THIS INSPECTION MADE
9 ☐☐ ☐☐ ☐☐
MONTH DAY YEAR

POPULATION SERVED BY DISTRIBUTION SYSTEM (EXCLUSIVE OF SERVICE TO OTHER WATER PURVEYORS) ☐☐☐☐☐☐☐☐ .

OWNERSHIP
1 - Public
2 - Private ☐ 23

SOURCE(S) -- NUMBER OF EACH
24 ☐ Surface ☐ Ground ☐ Purchased

NUMBER OF WATER PURVEYORS SERVED ☐☐

WATER PURCHASED FROM

SUPPLIER SEQUENCE NO. ☐☐☐☐ 32
FOR USE OF CENTRAL OFFICE

TREATMENT USED -- 1 = YES, 2 = NO

| | | | | | | |
|---|---|---|---|---|---|---|
| 33 | ☐ Copper Sulfate | ☐ Aeration | ☐ Microscreening | ☐ Activated Carbon | ☐ Lime-Soda Softening | 37 |
| 38 | ☐ Coagulation | ☐ Settling | ☐ Rapid Filtration 2 GPM/SF or less | ☐ Slow Sand Filtration | ☐ Diatomaceous Earth Filtration | 42 |
| 43 | ☐ High Rate Filtration More than 2 GPM/SF | ☐ Pressure Filtration | ☐ Sand Media | ☐ Anthracite Media | ☐ Mixed Media | 47 |
| 48 | ☐ Chlorination | ☐ Iron and/or Manganese Removal | ☐ Fluoridation | ☐ Ion Exchange | ☐ Corrosion Control | 52 |
| 53 | ☐ Potassium Permanganate | ☐ Phosphate Addition | ☐ Chlorine Dioxide | ☐ Chlorine Ammonia | ☐ None | 57 |

AVERAGE DAILY PRODUCTION (MGD)
58 ☐☐☐☐☐☐☐

AVERAGE DAILY CONSUMPTION (MGD)
☐☐☐☐☐☐☐

PLANT TYPE (A, B OR C) ☐

OPERATOR GRADE (CHIEF)
Required ☐☐ Actual ☐☐ 76

SOURCE STORAGE (GAL x $10^3$)
5 ☐☐☐☐☐☐☐☐☐

DISTRIBUTION STORAGE (GAL x $10^3$)
☐☐☐☐☐☐☐☐☐

NUMBER OF SERVICES
☐☐☐☐☐☐

% METERED
☐☐☐ 31

LOCAL WATER SUPPLY PROGRAM -- 1 = YES, 2 = NO, 3 = UNKNOWN, 4 = NOT APPLICABLE

32 ☐ Have plans and specifications for all additions or modifications been submitted to and approved by the State Commissioner of Health since the last annual inspection?

33 ☐ Have there been any emergencies due to water shortage, deterioration of water quality or other reasons since the last annual inspection?

34 ☐ Are all surface water sources disinfected?

35 ☐ Are all distribution reservoirs covered or the water leaving the reservoirs effectively disinfected?

36 ☐ Are complete daily operating records maintained and submitted to the local health unit having jurisdiction?

37 ☐ Is a minimum working pressure of 20 psi continuously maintained in all parts of the distribution system?

38 ☐ Is there a local ordinance or program for Inspection of physical connections to prohibit or eliminate all unsafe or hazardous connections?

39 ☐ --Is the ordinance enforced or the program effective in the elimination of health hazards?

40 ☐ Have rules and regulations for the protection of the water supply been enacted by the State Commissioner of Health under Section 1100 of the Public Health Law?

41 ☐ --Are they enforced?

42 ☐ -- Is an annual watershed enforcement report submitted to the local health unit?

43 ☐ Have uncorrected water quality problems been the subject of consumer complaints since the last annual inspection?

FORM SAN. 255 (5-69)

1 ☐☐☐☐ 4 Seq. No.

## EXAMINATIONS OF SAMPLES OF WATER

LABORATORIES USED - - 1 = YES, 2 = NO

| | | | | | |
|---|---|---|---|---|---|
| 5 ☐ Treatment Plant Laboratory | ☐ Chemical | ☐ Physical | ☐ Bacteriological | ☐ Microscopic | 9 |
| 10 ☐ Commercial Laboratories | ☐ Chemical | ☐ Physical | ☐ Bacteriological | ☐ Microscopic | 14 |
| 15 ☐ Local Government Laboratory | ☐ Chemical | ☐ Physical | ☐ Bacteriological | ☐ Microscopic | 19 |
| 20 ☐ State Laboratory | ☐ Chemical | ☐ Physical | ☐ Bacteriological | ☐ Microscopic | 24 |

## BACTERIOLOGICAL EXAMINATIONS

| UNTREATED | Required | Examined | DISTRIBUTION | Required | Examined (Avg) | |
|---|---|---|---|---|---|---|
| 25 Number of samples per year | ☐☐☐ | ☐☐☐ | Number of samples per month | ☐☐☐ | ☐☐☐ | 36 |

## DISTRIBUTION BACTERIOLOGICAL EXAMINATIONS

TUBE METHOD FOR COLIFORM ORGANISMS: - - 1 = YES, 2 = NO, 3 = UNKNOWN, 4 = NOT APPLICABLE

| | | MONTH AND YEAR MO. | MONTH AND YEAR YR. | NUMBER OF DISTRIBUTION SAMPLES |
|---|---|---|---|---|
| 37 ☐ | Did the arithmetic average of the most probable number (MPN) per 100 ml of all samples collected in any month exceed 1.1 per 100 ml of sample? | | | |
| | Did a most probable number (MPN) per 100 ml of 8.8 or greater occur in: | | | |
| 38 ☐ | More than one sample when less than 20 were examined in the month or more than 5% of the samples when 20 or more were examined in the month? | ☐☐ | ☐☐ | ☐☐☐☐ |
| 39 ☐ | Two consecutive samples? | ☐☐ | ☐☐ | ☐☐☐☐ |
| | MEMBRANE FILTER METHOD FOR COLIFORM ORGANISMS: - - 1 = YES, 2 = NO, 3 = UNKNOWN, 4 = NOT APPLICABLE | ☐☐ | ☐☐ | ☐☐☐☐ |
| 40 ☐ | Did the arithmetic average of the membrane filter count per 100 ml of sample examined in any month exceed 1 per 100 ml of sample? | ☐☐ | ☐☐ | ☐☐☐☐ |
| | Did coliform colonies per sample exceed 3 per 50 ml, 4 per 100 ml, 7 per 200 ml or 13 per 500 ml in: | ☐☐ | ☐☐ | ☐☐☐☐ |
| 41 ☐ | More than one sample when less than 20 were examined in the month or more than 5% of the samples when 20 or more were examined in the month? | ☐☐ | ☐☐ | ☐☐☐☐ |
| 42 ☐ | Two consecutive samples? | ☐☐ | ☐☐ | ☐☐☐☐ |

43 ☐ 1 = Yes 2 = No 3 = Unknown — The bacteriological quality of the drinking water conforms to the standards of the State of New York Administrative Rules and Regulations, Part 72, DRINKING WATER STANDARDS.

## PHYSICAL ANALYSIS

SOURCE

44 Are the untreated waters of the source(s) sampled at the minimum frequency? Ground 1/yr Surface 1/wk — 1 = Yes 2 = No ☐

DISTRIBUTION

| Previous physical sample taken MO. | DAY | YR. | Date this physical sample taken MO. | DAY | YR. | |
|---|---|---|---|---|---|---|
| ☐☐ | ☐☐ | ☐☐ | ☐☐ | ☐☐ | ☐☐ | 56 |

## DISTRIBUTION PHYSICAL ANALYSIS

57 Turbidity (5 s.u.)------------ ☐☐.☐ Color (15 s.u.)------------ ☐☐.☐ Odor (3 s.u.)- ------------------ ☐ 63

64 ☐ 1 = Yes 2 = No 3 = Unknown — The physical characteristics of the drinking water conform with the standards of the State of New York Administrative Rules and Regulations, Part 72, DRINKING WATER STANDARDS.

## CHEMICAL ANALYSIS

SOURCE

65 Are the untreated waters of the source(s) sampled at the minimum frequency? Ground 1/yr Surface 2/yr — 1 = Yes 2 = No ☐

DISTRIBUTION

| Previous chemical sample taken MO. | DAY | YR. | Date this chemical sample taken MO. | DAY | YR. | |
|---|---|---|---|---|---|---|
| ☐☐ | ☐☐ | ☐☐ | ☐☐ | ☐☐ | ☐☐ | 77 |

## DISTRIBUTION CHEMICAL ANALYSIS (mg/1) (A blank indicates no report)

| | | | | | | |
|---|---|---|---|---|---|---|
| 05 | ABS (.5) ---------------- ☐☐.☐ | Arsenic (.05) -------------- .☐☐☐ | Chromium (hexavalent) (.05) ------------- .☐☐☐ | 13 |
| 14 | Barium (1.0) ----------- ☐.☐ | Cadmium (.01) ------- ☐.☐☐☐ | Iron (.3) -------------------- ☐☐.☐☐ | 23 |
| 24 | Chloride (250) ------- ☐☐☐.☐ | CCE (.2) ---------------- .☐☐☐ | Manganese (.3) ------------------ ☐.☐☐ | 33 |
| 34 | Copper (1.0) ----------- ☐☐.☐ | Cyanide (.2) ------------ .☐☐☐ | Nitrate (as N) (10.) -------------- ☐☐.☐☐ | 43 |
| 44 | Fluoride (1.5) ---------- ☐.☐ | Lead (.05) --------------- .☐☐☐ | pH ------------------------------ ☐.☐ | 50 |
| 51 | Sulfates (250) ------- ☐☐☐. | Phenols (.001) ---------- .☐☐☐ | Alkalinity (as Ca $CO_3$) --------- ☐☐☐.☐ | 60 |
| 61 | Zinc (5.0) ---------- ☐☐.☐ | Selenium (.01) ---------- .☐☐☐ | Hardness (as Ca $CO_3$) ---------- ☐☐☐. | 69 |
| 70 | TDS (500) -------- ☐☐☐☐. | Silver (.05) -------------- .☐☐☐ | (Numbers in ( ) are maximum limits in mg/1) | 76 |

77 ☐ 1 = Yes 2 = No 3 = Data Incomplete — The chemical characteristics of the drinking water conform to the standards of the State of New York Administrative Rules and Regulations, Part 72, DRINKING WATER STANDARDS.

| | | |
|---|---|---|
| Sodium ------------ ☐☐☐.☐ | Nitrite (as N) ----------- .☐☐☐ | Ammonia Free (as N) ------------------ .☐☐☐ |
| Magnesium ---------- ☐☐☐.☐ | Oxygen Consumed -- ☐☐.☐☐☐ | Ammonia alb. (as N) ------------------ .☐☐☐ |

INSPECTING ENGINEER (NAME AND TITLE)

HEALTH AGENCY

A129

# APPENDIX D

## WATER RESOURCES - PROJECT ILLUSTRATIONS

a. CPWS-27 City of New York and County of Westchester

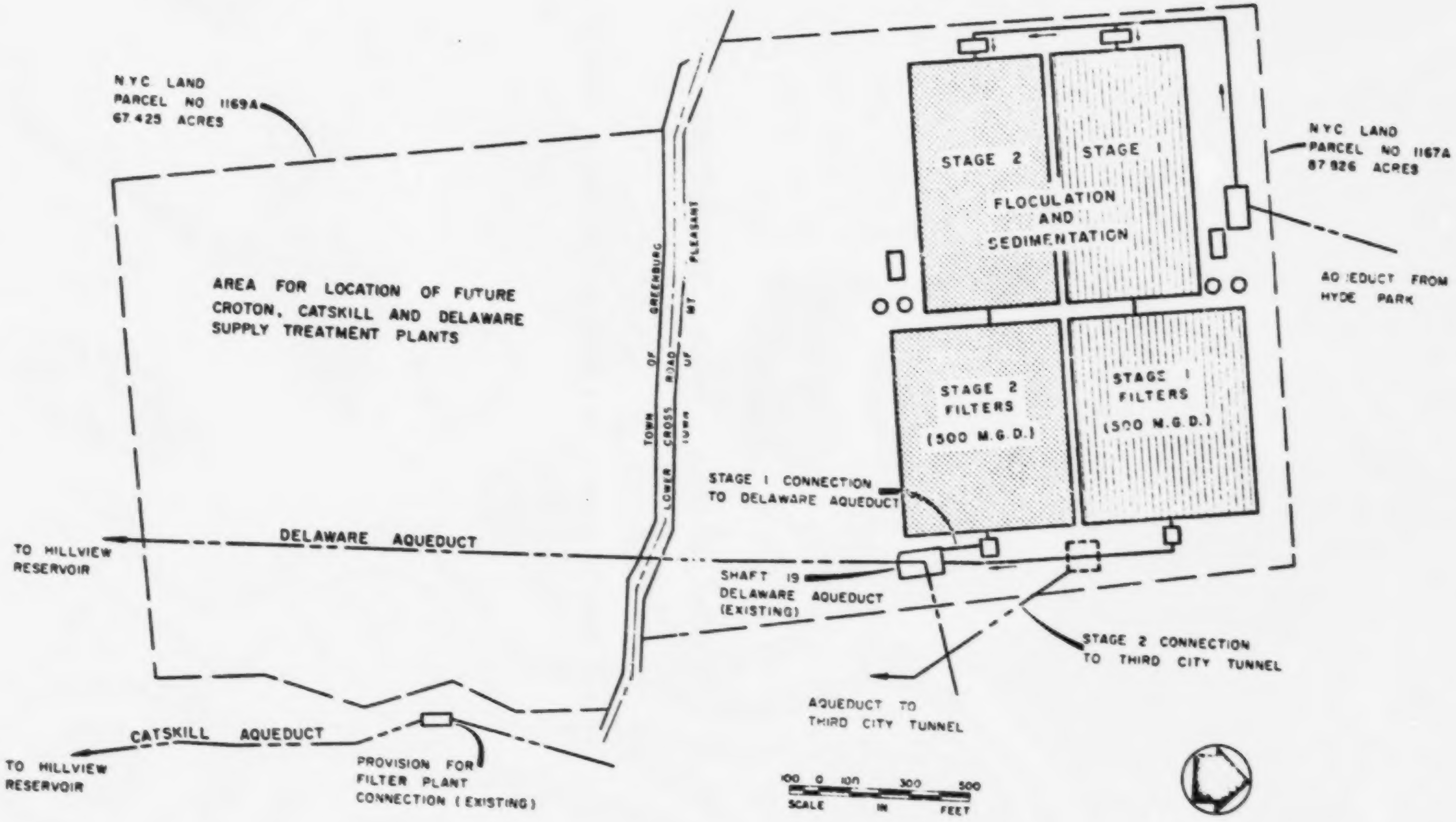

NYC LAND
PARCEL NO 1169A
67.425 ACRES
AREA FOR LOCATION OF FUTURE CROTON, CATSKILL AND DELAWARE SUPPLY TREATMENT PLANTS
TOWN OF GREENBURG
LOWER CROSS ROAD
TOWN OF MT PLEASANT
STAGE 2
STAGE 1
FLOCULATION AND SEDIMENTATION
STAGE 2 FILTERS (500 M.G.D.)
STAGE 1 FILTERS (500 M.G.D.)
NYC LAND
PARCEL NO 1167A
87.926 ACRES
AQUEDUCT FROM HYDE PARK
STAGE 1 CONNECTION TO DELAWARE AQUEDUCT
TO HILLVIEW RESERVOIR
DELAWARE AQUEDUCT
SHAFT 19 DELAWARE AQUEDUCT (EXISTING)
STAGE 2 CONNECTION TO THIRD CITY TUNNEL
AQUEDUCT TO THIRD CITY TUNNEL
TO HILLVIEW RESERVOIR
CATSKILL AQUEDUCT
PROVISION FOR FILTER PLANT CONNECTION (EXISTING)
100 0 100 300 500
SCALE IN FEET

FIG. 23 HUDSON RIVER-EASTVIEW PROJECT - FACILITIES PLAN

7779-2 NYC-WESTCHESTER WATER REPT-CPWS 27/JV

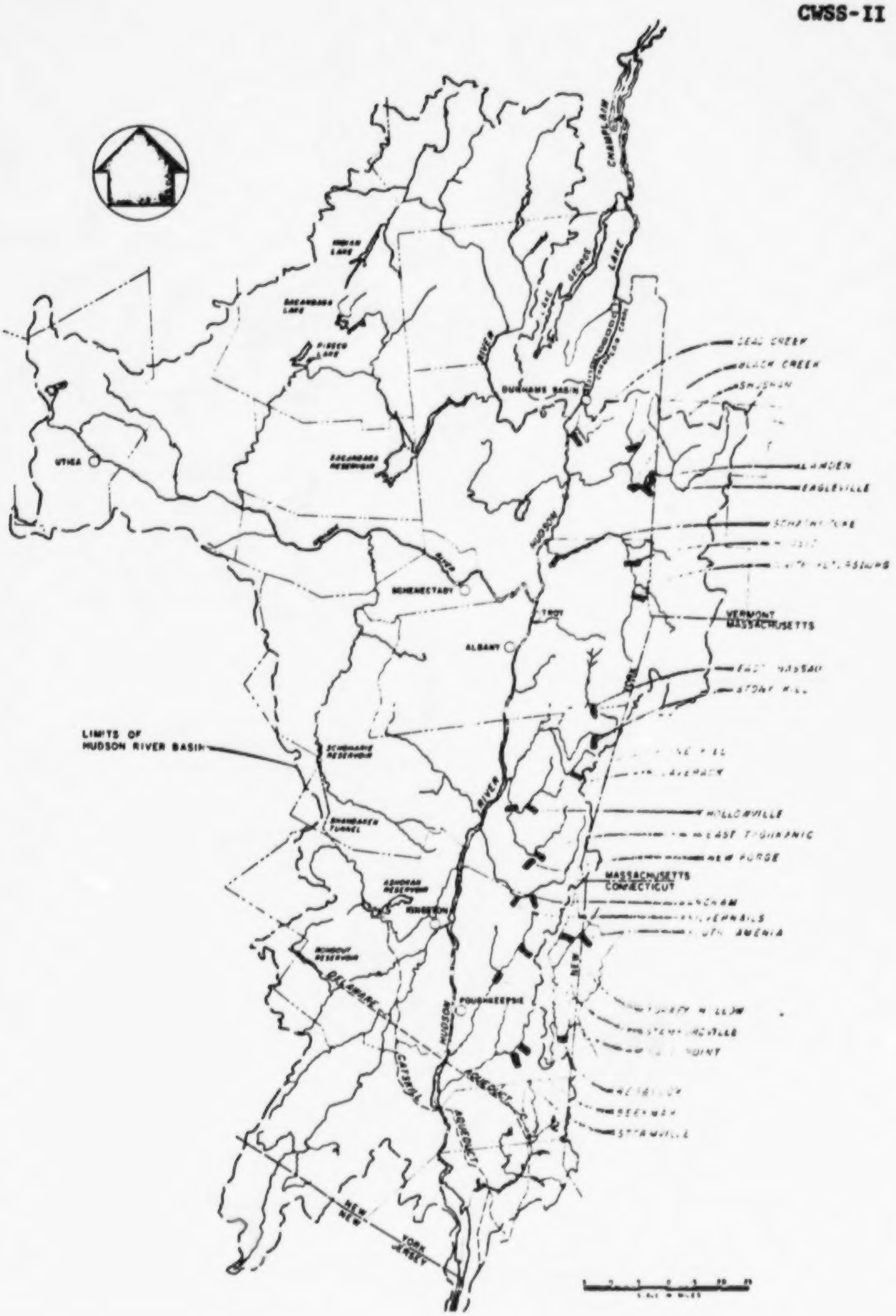

CHAMPLAIN
LAKE
LAKE GEORGE
INDIAN LAKE
SACANDAGA LAKE
PISECO LAKE
SACANDAGA RESERVOIR
RIVER
DURHAMS BASIN
UTICA
HUDSON
RIVER
SCHENECTADY
TROY
ALBANY
BLACK CREEK
LAMDEN
EAGLEVILLE
VERMONT
MASSACHUSETTS
EAST NASSAU
STONY KILL
LIMITS OF
HUDSON RIVER BASIN
SCHOHARIE RESERVOIR
SHANDAKEN TUNNEL
RIVER
HOLLOWVILLE
EAST TAGHKANIC
NEW FORGE
MASSACHUSETTS
CONNECTICUT
ASHOKAN RESERVOIR
KINGSTON
AMENIA
RONDOUT RESERVOIR
DELAWARE
NEW
POUGHKEEPSIE
HUDSON
CATSKILL
AQUEDUCT
POINT
BEEKMAN
STORMVILLE
AQUEDUCT
NEW YORK
NEW JERSEY

FIG. 24 HUDSON EAST PROJECT — POTENTIAL RESERVOIR SITES

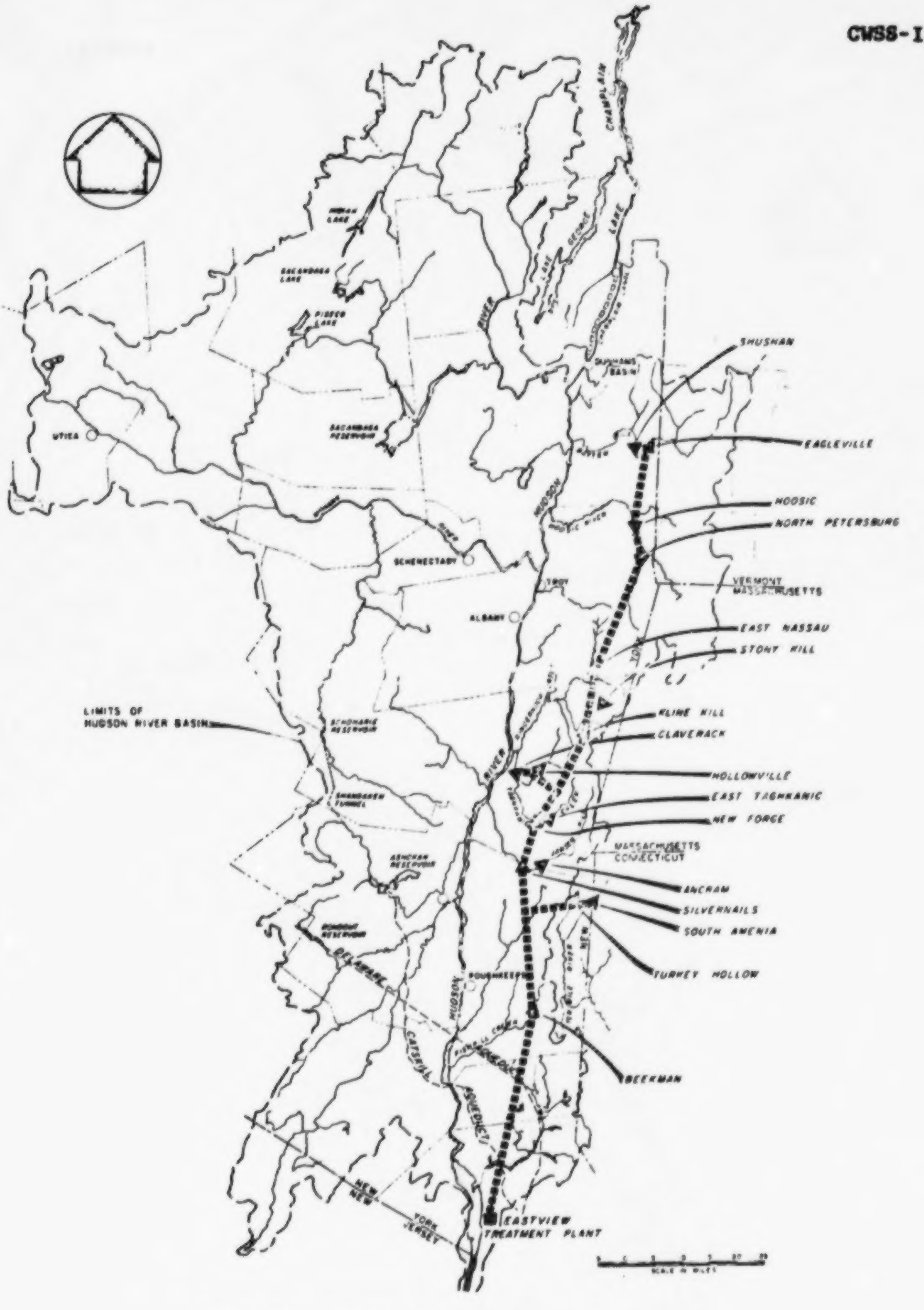

SHUSHAN
EAGLEVILLE
HOOSIC
NORTH PETERSBURG
VERMONT
MASSACHUSETTS
EAST NASSAU
STONY KILL
KLINE KILL
CLAVERACK
HOLLOWVILLE
EAST TAGHKANIC
NEW FORGE
MASSACHUSETTS
CONNECTICUT
ANCRAM
SILVERNAILS
SOUTH AMENIA
TURKEY HOLLOW
BEEKMAN
EASTVIEW
TREATMENT PLANT
LIMITS OF
HUDSON RIVER BASIN
UTICA
SCHENECTADY
ALBANY
TROY
POUGHKEEPSIE
INDIAN LAKE
SACANDAGA LAKE
PISECO LAKE
SACANDAGA RESERVOIR
SCHOHARIE RESERVOIR
SHANDAKEN TUNNEL
ASHOKAN RESERVOIR
RONDOUT RESERVOIR
DELAWARE
CATSKILL
HUDSON
RIVER
LAKE GEORGE
CHAMPLAIN
LAKE
HOOSIC RIVER
NEW YORK
NEW JERSEY
SCALE IN MILES

FIG. 26 HUDSON EAST PROJECT - PLAN

7779-2 NYC-WESTCHESTER WATER REPT-CPWS 27/JV

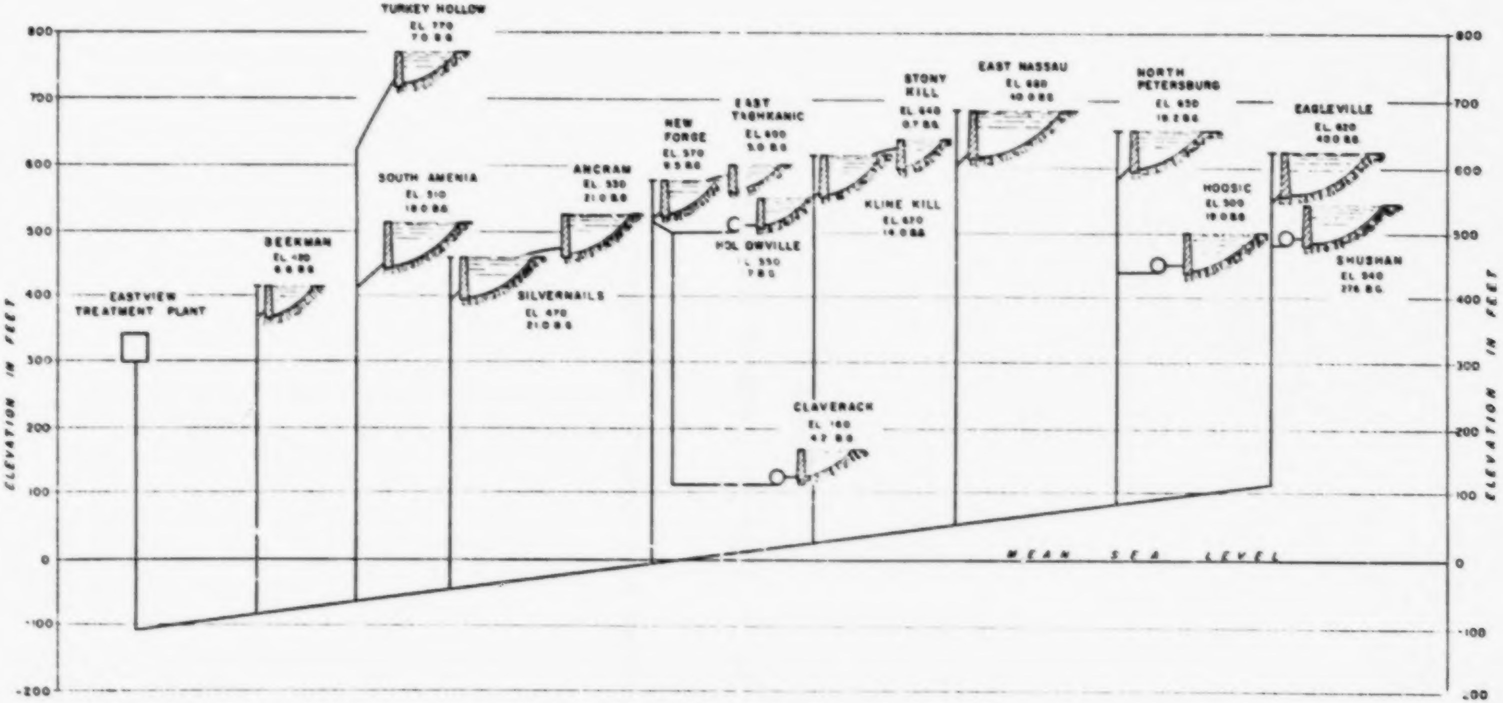

ELEVATION IN FEET
800
700
600
500
400
300
200
100
0
-100
-200
EASTVIEW TREATMENT PLANT
BEEKMAN
EL 410
6.6 B.G.
TURKEY HOLLOW
EL 770
70 B.G.
SOUTH AMENIA
EL 510
18.0 B.G.
SILVERNAILS
EL 470
21.0 B.G.
ANCRAM
EL 530
21.0 B.G.
NEW FORGE
EL 570
9.5 B.G.
EAST TAGHKANIC
EL 600
3.0 B.G.
HOL OWVILLE
L 550
7 B.G.
CLAVERACK
EL 160
42 B.G.
STONY KILL
EL 640
0.7 B.G.
KLINE KILL
EL 610
14.0 B.G.
EAST NASSAU
EL 680
40.0 B.G.
NORTH PETERSBURG
EL 650
19.2 B.G.
HOOSIC
EL 500
19.0 B.G.
EAGLEVILLE
EL 620
400 B.G.
SHUSHAN
EL 540
276 B.G.
MEAN SEA LEVEL

FIG. 27 HUDSON EAST PRO.ECT - PROFILE

7779-2 NYC-WESTCHESTER WATER REPT-CPWS 27/JV

# APPENDIX D

## WATER RESOURCES - PROJECT ILLUSTRATIONS

b. Crops of Engineers, NEWS Study

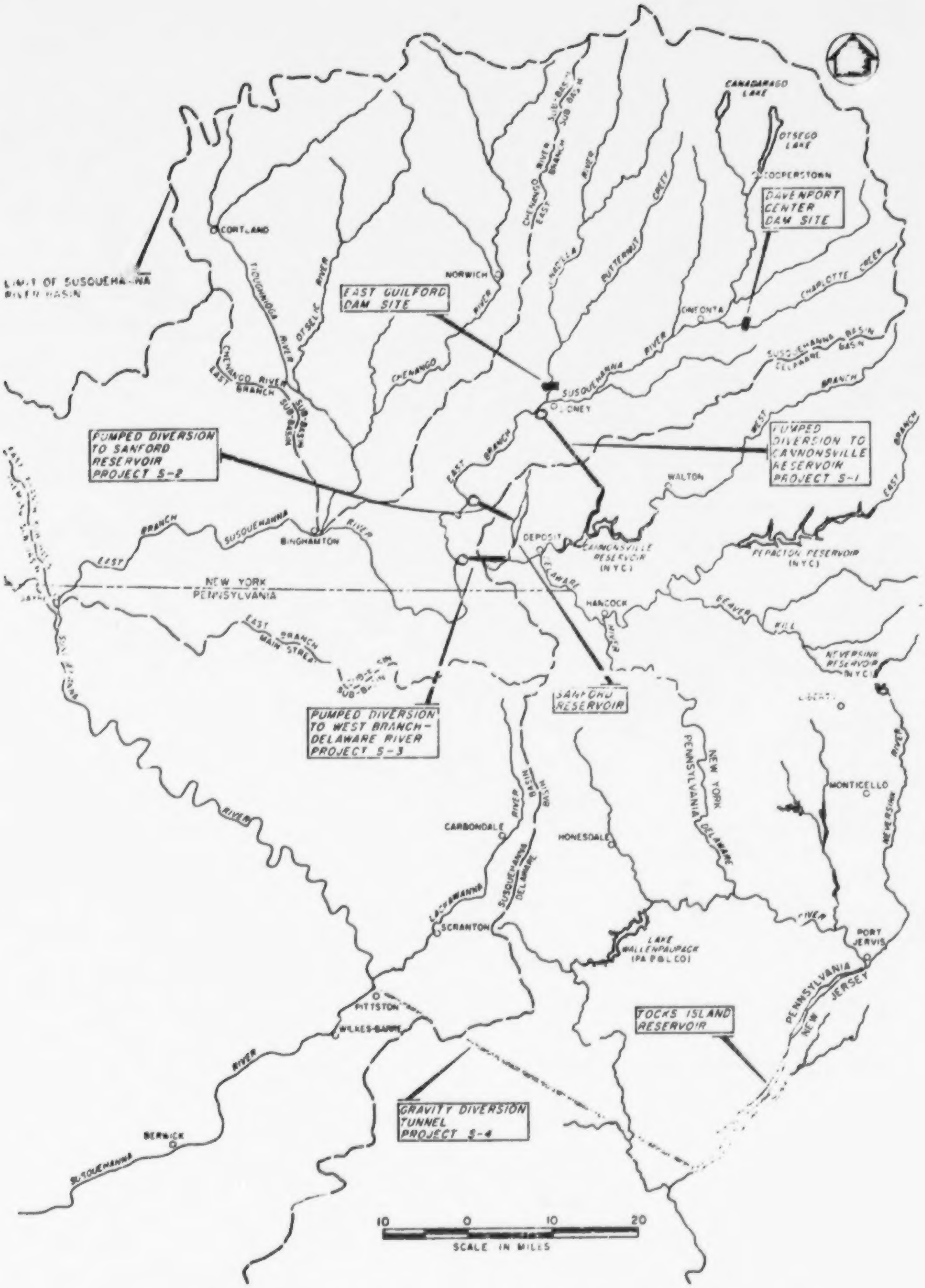

CANADARAGO LAKE
OTSEGO LAKE
COOPERSTOWN
DAVENPORT CENTER DAM SITE
CORTLAND
LIMIT OF SUSQUEHANNA RIVER BASIN
NORWICH
EAST GUILFORD DAM SITE
TIOUGHNIOGA RIVER
OTSELIC RIVER
CHENANGO RIVER
UNADILLA RIVER
BUTTERNUT CREEK
ONEONTA
CHARLOTTE CREEK
SUSQUEHANNA RIVER
SUSQUEHANNA BASIN
DELAWARE BASIN
SIDNEY
PUMPED DIVERSION TO SANFORD RESERVOIR PROJECT S-2
PUMPED DIVERSION TO CANNONSVILLE RESERVOIR PROJECT S-1
WALTON
WEST BRANCH
EAST BRANCH
BINGHAMTON
DEPOSIT
CANNONSVILLE RESERVOIR (N.Y.C.)
PEPACTON RESERVOIR (N.Y.C.)
NEW YORK
PENNSYLVANIA
HANCOCK
DELAWARE RIVER
BEAVER KILL
NEVERSINK RESERVOIR (N.Y.C.)
SANFORD RESERVOIR
PUMPED DIVERSION TO WEST BRANCH-DELAWARE RIVER PROJECT S-3
LIBERTY
MONTICELLO
NEVERSINK RIVER
CARBONDALE
HONESDALE
LACKAWANNA RIVER
SCRANTON
LAKE WALLENPAUPACK (PA P&L CO)
PORT JERVIS
NEW JERSEY
PITTSTON
WILKES-BARRE
TOCKS ISLAND RESERVOIR
GRAVITY DIVERSION TUNNEL PROJECT S-4
BERWICK
10 0 10 20
SCALE IN MILES

FIG. 6 SUSQUEHANNA RIVER BASIN PROJECTS

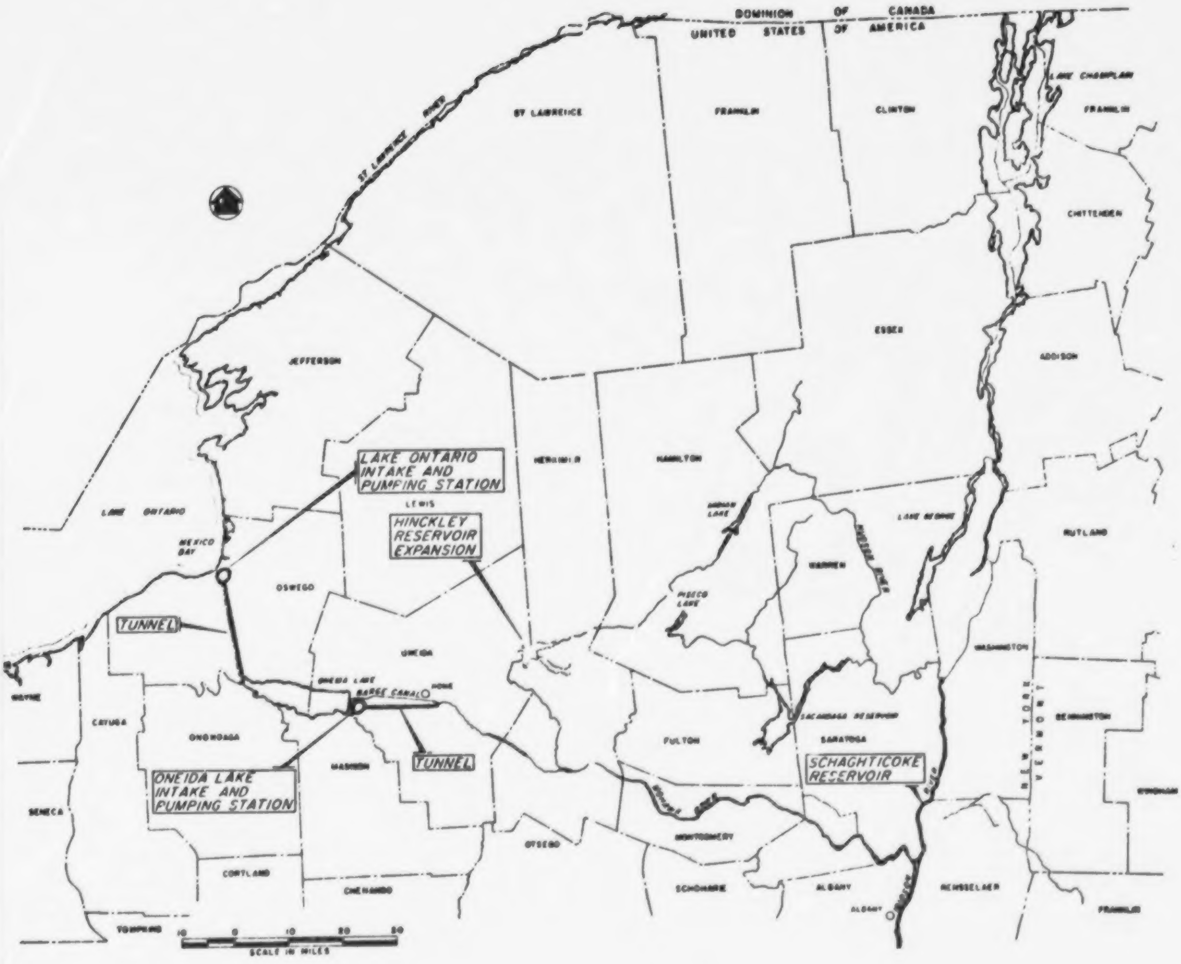

DOMINION OF CANADA
UNITED STATES OF AMERICA
ST LAWRENCE RIVER
ST LAWRENCE
FRANKLIN
CLINTON
LAKE CHAMPLAIN
FRANKLIN
CHITTENDEN
ESSEX
ADDISON
JEFFERSON
LAKE ONTARIO INTAKE AND PUMPING STATION
LEWIS
HERKIMER
HAMILTON
HINCKLEY RESERVOIR EXPANSION
INDIAN LAKE
LAKE GEORGE
HUDSON RIVER
RUTLAND
LAKE ONTARIO
MEXICO BAY
OSWEGO
PISECO LAKE
WARREN
TUNNEL
ONEIDA
WASHINGTON
ONEIDA LAKE
BARGE CANAL
ROME
WAYNE
CAYUGA
ONONDAGA
FULTON
SACANDAGA RESERVOIR
SARATOGA
NEW YORK
VERMONT
BENNINGTON
MADISON
TUNNEL
ONEIDA LAKE INTAKE AND PUMPING STATION
SCHAGHTICOKE RESERVOIR
SENECA
MOHAWK RIVER
MONTGOMERY
OTSEGO
WINDHAM
CORTLAND
CHENANGO
SCHOHARIE
ALBANY
ALBANY
RENSSELAER
HUDSON RIVER
TOMPKINS
10 0 10 20 30
SCALE IN MILES

FIG. 27 HUDSON PROJECT HU-2

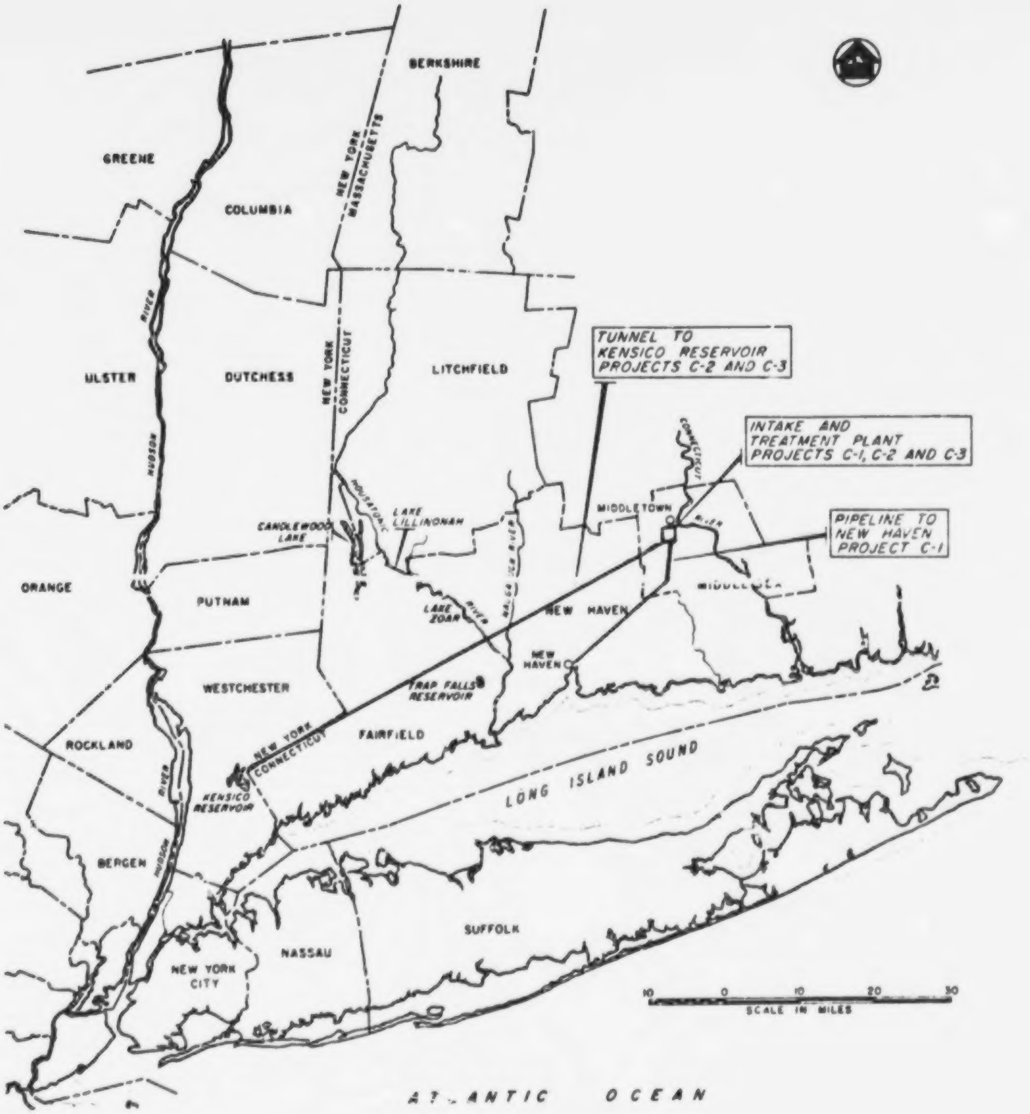

BERKSHIRE
GREENE
COLUMBIA
NEW YORK MASSACHUSETTS
ULSTER
DUTCHESS
NEW YORK CONNECTICUT
LITCHFIELD
HUDSON RIVER
TUNNEL TO KENSICO RESERVOIR PROJECTS C-2 AND C-3
INTAKE AND TREATMENT PLANT PROJECTS C-1, C-2 AND C-3
PIPELINE TO NEW HAVEN PROJECT C-1
CONNECTICUT RIVER
MIDDLETOWN
MIDDLESEX
CANDLEWOOD LAKE
LAKE LILLINONAH
HOUSATONIC
NAUGATUCK RIVER
ORANGE
PUTNAM
LAKE ZOAR
NEW HAVEN
WESTCHESTER
TRAP FALLS RESERVOIR
ROCKLAND
NEW YORK CONNECTICUT
FAIRFIELD
LONG ISLAND SOUND
KENSICO RESERVOIR
BERGEN
SUFFOLK
NASSAU
NEW YORK CITY
10 0 10 20 30
SCALE IN MILES
ATLANTIC OCEAN

FIG. 38 CONNECTICUT RIVER BASIN PROJECTS

# APPENDIX E

## COMPUTER ANALYSIS EVALUATION CRITERIA

## WATER QUALITY CRITERIA

## COMPUTER ANALYSIS EVALUATION CRITERIA

The information contained in this appendix was based on forms PHS-682, ECA 18, and ECA 19 as well as the laboratory analysis. It was prepared in Cincinnati and is presented for comparison of the New York SMSA data with that in the national report, which covers all nine areas.*

For the purpose of this appendix, water supply systems were divided into four categories: 1) those using surface water as a mixture of surface and ground water as a source; 2) those using ground water as a source (this category was further divided into: a) wells, b) springs, and c) springs and wells); 3) those purchasing finished water as a source; and 4) special water supply systems. Table 1 gives data on type, population, average daily demand, and source for the supplies included in this study. Table II shows the number of systems in each category and the population served.

---

* Analysis is based on Public Health Service Drinking Water Standards which differ in several areas from the New York State Drinking Water Standards

Each water supply system was investigated on three basis: 1) drinking water quality was determined by sampling the finished and distributed water and returning these samples to the laboratories of the Bureau of Water Hygiene for bacteriological, chemical, and trace metal analyses, 2) the status of the water supply system facilities was determined by a field survey of the system and the gathering of data on three standard forms (four items were chosen to represent major problems: a) source(s), b) treatment, if any, c) distribution system pressures, and d) operation); 3) the status of the surveillance program over the water supply system was evaluated by obtaining bacteriological water quality data for the previous 12 months of record from state and county health department files.

## WATER QUALITY CRITERIA

Water quality was judged either:

1. Not to exceed the Constituent Limits of DWS (hereafter called Does not exceed limits) or,
2. To exceed at least one "recommended" Constituent Limit (some are aesthetic parameters), but does not exceed any "mandatory" Constituent Limit (hereafter called Exceed recommended, but not mandatory limits) or,
3. To exceed at least one "mandatory" Constituent Limit (hereafter called Exceed mandatory limits).

The limits for the constituents measured in this study are summarized in the Table 5 below.

## TABLE 5

Partial List of Bacteriological, Chemical, and Physical Constituent Concentration Limits Taken from the 1962 U.S. Public Health Service Drinking Water Standards

### RECOMMENDED LIMITS

(If the concentration of any of these constituents are exceeded, a more suitable supply or treatment should be sought)

| Constituent | Limit |
|---|---|
| Alkyl Benzene Sulfonate (Measured as methylene-blue-active substances) | 0.5 mg/l |
| Arsenic | 0.01 mg/l* |
| Boron | 1.0 mg/l** |
| Chloride | 250 mg/l |
| Color | 15 Units |
| Copper | 1.0 mg/l |
| Carbon-Chloroform Extract (CCE) | 0.200 mg/l |
| Cyanide | 0.01 mg/l |
| Fluoride | |
| Temp. (Ann.Avg.Max.Day, 5 years or more) | |
| 50.0-53.7 | 1.7 mg/l |
| 53.8-58.3 | 1.5 mg/l |
| 58.4-63.8 | 1.3 mg/l |
| 63.9-70.6 | 1.2 mg/l |
| 70.7-79.2 | 1.0 mg/l |
| 79.3-90.5 | 0.8 mg/l |
| Iron | 0.3 mg/l |
| Manganese | 0.05 mg/l |
| Nitrate | 45 mg/l |
| Radium-226 | 3 μμc/l (pc/l)*** |
| Strontium-90 | 10 μμc/l (pc/l)*** |
| Sulfate | 250 mg/l |
| Total Dissolved Solids (TDS) | 500 mg/l |
| Turbidity | |
| Untreated | 5 Units |
| Treated by more than disinfection | 1 Unit |
| Zinc | 5 mg/l |

## TABLE 5 (Contd.)
## MANDATORY LIMITS

(If the concentration of any of these constituents are exceeded, the further use of this water for drinking and culinary purposes should be evaluated by the appropriate health authority because water of this quality represents a potential hazard to the health of consumers.)

| Constituent | Limit |
|---|---|
| Arsenic | 0.05 mg/l |
| Barium | 1.0 mg/l |
| Boron | 5.0 mg/l** |
| Cadmium | 0.01 mg/l |
| Chromium (hexavalent) | 0.05 mg/l |
| Coliform organisms (Measured by membrane filter technique) | Fails std. if:<br>a) Arithmetic average of samples collected greater than 1 per 100 ml<br>b) Two or more samples (5% or more if more than 20 examined) contain densities more than 4/100 ml |
| Cyanide | 0.2 mg/l |
| Fluoride | |
| Temp. (Ann.Avg.Max.Day - 5 years or more) | |
| 50.0-53.7 | 2.4 mg/l |
| 53.8-58.3 | 2.2 mg/l |
| 58.4-63.8 | 2.0 mg/l |
| 63.9-70.6 | 1.8 mg/l |
| 70.7-79.2 | 1.6 mg/l |
| 79.3-90.5 | 1.4 mg/l |
| Gross Beta activity (in the absence of $\alpha$ or Sr-90) | 1,000 $\mu\mu$c/l (pc/l)*** |
| Lead | 0.05 mg/l |
| Selenium | 0.01 mg/l |
| Silver | 0.05 mg/l |

---

*Although the recommended arsenic concentration is 0.01 mg/l, because of interferences in some waters, the concentration of arsenic was only determined to be less than 0.03 mg/l. For the purposes of this study, these waters were considered not to exceed the recommended standard.

**Proposed for inclusion in the Drinking Water Standards.

***If these limits are exceeded, refer to Section 6.2 of the DWS.

## Facilities Criteria

Source, treatment, operation, and distribution facilities were judged either:

1) To be essentially free from major deficiencies, or
2) To have one or more of the following major deficiencies (where applicable)
    a) Inadequate source protection (in absence of disinfection or buying chlorinated water)
    b) Inadequate disinfection (if disinfection practiced)
    c) Inadequate control of disinfection (if practiced or if purchasing chlorinated water)
    d) Inadequate clarification capabilities (if clarification practiced)
    e) Inadequate control of clarification (if clarification practiced)
    f) Inadequate pressure (<20 psi) in some or all areas of the distribution system

## Bacteriological Surveillance Program Criteria

The bacteriological surveillance program over the water supply system was judged either:

1) To meet the following criteria or,
2) Not to meet one or both of the following,
    a) Collection of the required number* of bacteriological samples for no less than 11 months during the previous 12 months of record.
    b) Passing the bacteriological quality standard* for no less than 11 months during the previous 12 months of record.

---

*See pages 3-6 of the Drinking Water Standards.

## TABLE 1

## WATER TREATMENT PRACTICES IN THE SYSTEMS STUDIED

| Treatment Practice | Type of System (Number of Systems of each) | | | | | | Overall System Totals | |
|---|---|---|---|---|---|---|---|---|
| | Surface Water & Mixed Source | Ground Water Source | | | Wholesale Finished Water Source | Special Systems | | |
| | | Springs | Wells | Mixture of Both | | | Number | Percent |
| Do not disinfect, clarify, or buy, chlorinated water | 0 | 0 | 85 | 1 | 2 | 24 | 112 | 51 |
| Disinfection only or buy chlorinated water | 5 | 0 | 46 | 0 | 26 | 7 | 84 | 38 |
| Clarification* and disinfection | 11 | 0 | 8 | 0 | 2 | 1 | 22 | 10 |
| Clarification* without disinfection | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 1 |
| System Totals - Number | 16 | 0 | 142 | 1 | 30 | 32 | 221 | 100 |

*Clarification is the removal of suspended material by coagulation, sedimentation and/or filtration.

TABLE 2

WATER TREATMENT PRACTICES IN THE SYSTEMS STUDIED

| Treatment Practice | Population Served in Thousands (Number of Systems of Each) | | | | | | | Overall System Totals | |
|---|---|---|---|---|---|---|---|---|---|
| | <.5 | .5-5 | 5-10 | 10-25 | 25-50 | 50-100 | > 100 | Number | Percent |
| Do not disinfect, clarify, or buy chlorinated water | 53 | 34 | 7 | 10 | 6 | 2 | 0 | 112 | 51 |
| Disinfection only or buy chlorinated water | 18 | 13 | 17 | 8 | 16 | 5 | 7 | 84 | 38 |
| Clarification* and disinfection | 3 | 7 | 2 | 3 | 2 | 2 | 3 | 22 | 10 |
| Clarification* without disinfection | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 3 | 1 |
| System Totals - Number | 75 | 54 | 27 | 21 | 25 | 9 | 10 | 221 | 100 |

*Clarification is the removal of suspended material by coagulation, sedimentation and/or filtration.

TABLE 3

WATER QUALITY EVALUATION BY SOURCE

| | Type of System (All data are percent of System Totals) | | | | | | Overall System Totals | |
|---|---|---|---|---|---|---|---|---|
| | Surface Water & Mixed Source | Ground Water | | | Wholesale Finished Water Source | Special Systems | | |
| | | Springs | Wells | Mixture of Both | | | Number | Percent |
| Essentially meet Constituent Standards | 69 | 0 | 64 | 100 | 83 | 75 | 152 | 69 |
| Do not essentially meet Constituent Standards | 31 | 0 | 36 | 0 | 17 | 25 | 69 | 31 |
| Exceeds one or more recommended Constituent Standards (some are aesthetic parameters) | 12 | 0 | 28 | 0 | 14 | 22 | 53 | 24 |
| Exceeds one or more mandatory Constituent Standard | 19 | 0 | 8 | 0 | 3 | 3 | 16 | 7 |
| System Totals - Number | 16 | 0 | 142 | 1 | 30 | 32 | 221 | 100 |

Note: 91 percent of the study population was served drinking water that essentially met the Constituent Standards.

## TABLE 4

## WATER QUALITY EVALUATION BY COMMUNITY SIZE

| | Population Served in Thousands (All data are percent of Size Totals) | | | | | | | Overall System Totals | |
|---|---|---|---|---|---|---|---|---|---|
| | <.5 | .5-5 | 5-10 | 10-25 | 25-50 | 50-100 | >100 | Number | Percent |
| **Essentially meet Constituent Standards** | 63 | 74 | 63 | 76 | 72 | 78 | 70 | 152 | 69 |
| **Do not essentially meet Constituent Standards** | 37 | 26 | 37 | 24 | 28 | 22 | 30 | 69 | 31 |
| **Exceeds one or more recommended Constituent Standards (Some are aesthetic parameters(** | 29 | 19 | 22 | 19 | 24 | 22 | 30 | 53 | 24 |
| **Exceeds one or more mandatory Constituent Standard** | 8 | 7 | 15 | 5 | 4 | 0 | 0 | 16 | 7 |
| System Totals - Number | 75 | 54 | 27 | 21 | 25 | 9 | 10 | 221 | 100 |

Note: 91 percent of the study population was served drinking water that essentially met the Constituent Standards.

## TABLE 5

## FACILITIES EVALUATION BY SOURCE

| | Type of System (All data are percent of System Totals | | | | | | Overall System Totals | |
|---|---|---|---|---|---|---|---|---|
| | Surface Water & Mixed Source | Ground Water | | | Wholesale Finished Water Source | Special Systems | Number | Percent |
| | | Springs | Wells | Mixture of Both | | | | |
| Essentially free of major deficiencies | 38 | 0 | 70 | 100 | 77 | 63 | 150 | 68 |
| Major Deficiencies | 62 | 0 | 30 | 0 | 23 | 37 | 71 | 32 |
| Inadequate source protection, in the absence of disinfection or buying chlorinated water | 0 | 0 | 9 | 0 | 0 | 6 | 15 | 7 |
| Inadequate disinfection , if practiced | 13 | 0 | 4 | 0 | 10 | 16 | 15 | 7 |
| Inadequate control of disinfection, if practiced or if buying chlorinated water | 0 | 0 | 1 | 0 | 3 | 3 | 4 | 2 |
| Inadequate clarification, if practiced | 25 | 0 | 1 | 0 | 0 | 0 | 5 | 2 |
| Inadequate control of clarification, if practiced | 19 | 0 | 1 | 0 | 0 | 0 | 4 | 2 |
| Low (<20 psi) pressure in some or all areas of the dist. system | 25 | 0 | 18 | 0 | 10 | 19 | 38 | 17 |
| System Totals - Number | 16 | 0 | 142 | 1 | 30 | 32 | 221 | 100 |

Reproduced from best available copy.

## TABLE 6

## FACILITIES EVALUATION BY COMMUNITY SIZE

| | Population Served in Thousands (All data are % of Size Totals) | | | | | | | System Overall/Totals | |
|---|---|---|---|---|---|---|---|---|---|
| | <.5 | .5-5 | 5-10 | 10-25 | 25-50 | 50-100 | >100 | Number | Percent |
| Essentially free of major deficiencies | 59 | 69 | 78 | 67 | 76 | 78 | 80 | 150 | 68 |
| Major Deficiencies | 41 | 31 | 22 | 33 | 24 | 22 | 20 | 71 | 32 |
| Inadequate source protection, in the absence of disinfection or buying chlorinated water | 12 | 11 | 0 | 0 | 0 | 0 | 0 | 15 | 7 |
| Inadequate disinfection, if practiced | 8 | 6 | 11 | 10 | 0 | 0 | 10 | 15 | 7 |
| Inadequate control of disinfection, if practiced or if buying chlorinated water | 1 | 2 | 4 | 0 | 4 | 0 | 0 | 4 | 2 |
| Inadequate clarification, if practiced | 1 | 0 | 4 | 10 | 0 | 11 | 0 | 5 | 2 |
| Inadequate control of clarification, if practiced | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 3 | 1 |
| Low (<20 psi) pressure in some or all areas of the dist. system | 23 | 15 | 7 | 19 | 20 | 11 | 10 | 38 | 17 |
| System Totals - Number | 75 | 54 | 27 | 21 | 25 | 9 | 10 | 221 | 100 |

## TABLE 7

## BACTERIOLOGICAL SURVEILLANCE EVALUATION BY COMMUNITY SIZE

| | Population Served in Thousands (All data are % of Size Totals) | | | | | | | System Overall/Totals | |
|---|---|---|---|---|---|---|---|---|---|
| | <.5 | .5-5 | 5-10 | 10-25 | 25-50 | 50-100 | >100 | Number | Percent |
| Meets bacteriological surveillance criteria | 3 | 0 | 0 | 5 | 0 | 0 | 10 | 4 | 2 |
| Does not meet bacteriological surveillance criteria | 97 | 100 | 100 | 95 | 100 | 100 | 90 | 217 | 98 |
| **Does not meet collection portion of the bacteriological surveillance criteria** | 97 | 100 | 100 | 95 | 100 | 100 | 90 | 217 | 98 |
| System Totals - Number | 75 | 54 | 27 | 21 | 25 | 9 | 10 | 221 | 100 |
| **Collecting less than half required number of samples** | 71 | 51 | 23 | 18 | 25 | 7 | 7 | 202 | |

TABLE 8

BACTERIOLOGICAL SURVEILLANCE EVALUATION BY SOURCE

| | Type of System (All data are percent of System Totals | | | | | | Overall System Totals | |
|---|---|---|---|---|---|---|---|---|
| | Surface Water & Mixed Source | Ground Water | | | Wholesale Finished Water Source | Special Systems | | |
| | | Springs | Wells | Mixture of Both | | | Number | Percent |
| Meets bacteriological surveillance criteria* | 0 | 0 | 2 | 0 | 0 | 3 | 4 | 2 |
| Does not meet bacteriological surveillance criteria* | 100 | 0 | 98 | 100 | 100 | 97 | 217 | 98 |
| Does not collect samples at rate in the bacteriological surveillance criteria* | 69 | 0 | 98 | 100 | 100 | 97 | 217 | 98 |
| System Totals - Number | 16 | 0 | 142 | 1 | 30 | 32 | 221 | 100 |
| **Collect less than half required number of samples** | 15 | 0 | 126 | 1 | 29 | 31 | 202 | - |

# APPENDIX F

# FORMS USED TO GATHER DATA

PHS 682

ECA 18

ECA 19

ECA 9

## REPORT OF WATER SUPPLY USED ON INTERSTATE CARRIERS

FOR USE OF PHS REGIONAL OFFICE

☐☐☐☐☐☐☐☐☐☐☐☐

*(Location code)*

1. NAME OF WATER SUPPLY FACILITY

LOCATION *(City, County, State)*

2. WATER SUPPLY OFFICIAL CONTACTED *(Name and Title)*

3. DATE THIS SURVEY MADE
MO. ☐☐ DAY ☐☐ YR. ☐☐

4. DATE OF LAST PHS - STATE JOINT SURVEY
MO. ☐☐ DAY ☐☐ YR. ☐☐

5. POPULATION SERVED BY DISTRIBUTION SYSTEM *(To the nearest hundred)* ☐☐☐☐☐☐☐☐.

6. OWNERSHIP
1 = Public
2 = Private ☐

7. SOURCE
1 = Surface
2 = Ground
3 = Combination ☐

8. TREATMENT USED -- 1 = YES, 2 = NO

☐ Disinfection
☐ Coagulation
☐ Rapid Sand Filtration
☐ Fluoridation
☐ Taste and Odor Control
☐ Lime Softening
☐ Ion Exchange
☐ Settling
☐ Iron Removal
☐ Other *(If yes describe under 13).*

9. LOCAL WATER SUPPLY PROGRAM -- 1 = YES, 2 = NO

☐ A. Is there a continuous program, such as a cross-connection survey, to detect health hazards and sanitary defects within the water distribution system?

☐ B. If there is a program such as described in "A" above are sanitary defects and health hazards being removed systematically and at a rate which is satisfactory?

☐ C. Does the community have an adequate plumbing code, such as the National Plumbing Code, or are there rules and regulations prohibiting connections or arrangements by which liquids, steams, gasses, or chemicals of unsafe, unknown, or questionable quality may be discharged or drawn into the public water supply?

☐ D. Are there provisions to enforce such code or rules and regulations on new construction?

☐ -- on major repairs and reconstruction?

☐ E. Are the principal plant operators certified or licensed under a state program?

☐ -- is such certification or licensing compulsory?

### CHEMICAL ANALYSIS (mg./1) (A blank indicates no report)

10.

MO. ☐☐ DAY ☐☐ YR. ☐☐ Date last chemical sample taken

How often are chemical analyses made?

Alkalinity (as Ca CO$_3$)
Arsenic (.05)**(.01)* - - - - -
Barium (1.0)* - - - - - - - - -
Cadmium (.01)** - - - - - - - -
Chromium Hexavalent (.05)**
Cyanide (.2)** (.01)* - - - -
Fluoride
Lead (.05)** - - - - -
Hardness (as Ca CO$_3$)
Selenium (.01)**

Silver (.05)**
ABS (.5)* - - - -
Chloride (250)*
Copper (1.0)* - - - - - -
CCE (.2)* - - - - - - - - - - - -
Iron (.3)* - - - - - - - -
Manganese (.05)*
Nitrate (NO$_3$ (45)* - -
Phenols (.001)*
Sulfates (250)*

TDS (500)*
Zinc (5.0)* - - - - - - - -
pH - - - - - - - - - - - - -
Magnesium - - - - - - -

*RECOMMENDED MAXIMUM **MAXIMUM CHEMICAL LIMITS --MG/L

### PHYSICAL AND RADIOCHEMICAL ANALYSIS

11.
How often are physical analyses made?

**PHYSICAL**

Turbidity (5 s.u.)
Color (15 s.u.) - - - - - - - - - - - - - - - - - - -
Odor (3 s.u.)
Avg. Water Temp. (°F) - - - - - - - - - - - - - - -
Avg. Air Temp. (°F)⑦

**RADIOCHEMICAL**

SR$^{90}$ (10 $\mu\mu c$/1)*
RA$^{226}$ (3 $\mu\mu c$/1)* - - - - - - - - - - - - - -
GROSS BETA (1000 $\mu\mu c$/1)*
GROSS ALPHA - - - - - - - - - - - - - - - - -
SR$^{89}$
I$^{131}$

* Limits from 1962 PHS Drinking Water Standards

PHS-682 (REV. 10-64)

## BACTERIOLOGICAL EXAMINATIONS

|  |  |  |
|---|---|---|
| 12. ☐☐☐☐ Minimum number of samples required per month① | LABORATORIES | DATES OF MOST RECENT LABORATORY CERTIFICATIONS |
|  |  |  |
|  |  |  |
| NAMES OF LABORATORY CERTIFYING AUTHORITIES |  |  |

| MONTH AND YEAR |  | NUMBER OF SAMPLES | TUBE METHOD |  |  |  |  | MEMBRANE FILTER METHOD |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  | ☐ 10 ML. OR ☐ 100 ML. STANDARD PORTIONS |  |  |  |  | MONTH AND YEAR |  | NUMBER OF SAMPLES | MEAN COLIFORM DENSITY PER 100 ML. ⑤ | SAMPLES HAVING COLIFORM DENSITIES EXCEEDING 3/50, 4/100, 7/200, 13/500 MLS. ⑥ |  |
|  |  |  | NUMBER | NUMBER POSITIVE ② | % POSITIVE ③ | SAMPLES HAVING 3 OR MORE 10 ML. OR 5 100 ML. PORTIONS POSITIVE ④ |  |  |  |  |  |  |  |
| MO. | YR. |  |  |  |  | NUMBER | % POSITIVE | MO. | YR. |  |  | NUMBER | % POSITIVE |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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Footnotes:

1. See Figure 1 PHS Drinking Water Standards (1962)
2. Any member of the coliform group of bacteria.
3. Should not exceed 10% per month, if 10 ml. portions are used, or 60% if 100 ml. portions are used.
4. If 10 ml. portions are used, should not exceed 5% in 20 or more samples per month nor one sample in less than 20 per month; if 100 ml. portions are used, should not exceed 20% in 5 or more samples per month nor one sample in less than 5 per month.
5. The arithmetic means density of all standard samples per month shall not exceed 1 per 100 ml.
6. Should not exceed 5% in 20 or more samples per month, nor 1 sample in less than 20 per month.
7. Maximum daily air temperature average for at least 5 years.

13. COMMENTS: *(Use additional sheet if necessary. Furnish complete description every three years)*

|  |  |  |
|---|---|---|
| REVIEWING ENGINEER *(Name and Title)* | AGENCY |  |
| CLASSIFICATION RECOMMENDED<br>1—Approved<br>2—Provisionally Approved<br>3—Prohibited<br>☐ | EXPIRATION DATE *(If provisionally approved)*<br>☐☐ MO. ☐☐ DAY ☐☐ YR. |  |
| DATE OF REVIEW<br>☐☐ MO. ☐☐ DAY ☐☐ YR. | SIGNATURE OF STATE HEALTH OFFICIAL | TITLE IF OTHER THAN REVIEWER |

PHS-682 (BACK)
REV. 10-64

GPO 818-129

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Consumer Protection and Environmental Health Service
Environmental Control Administration
Bureau of Water Hygiene

## INVENTORY OF MUNICIPAL WATER FACILITIES

LATEST DATA IN PHS FILES

| | | | |
|---|---|---|---|
| COMMUNITY | POPULATION<br>ESTIMATED POPULATION SERVED | YEAR OPER. STARTED<br>PRESENT SUPPLY<br>PRESENT TREATMENT PLANT | OWNERSHIP |
| 1 | 2 | 3 | 4 |
| | | | |

CURRENT DATA

STATE

| | | | |
|---|---|---|---|
| COMMUNITY OR FACILITY<br>Correct legal name<br>LOCATION (1) a<br>Postal address of utility | CENSUS POPULATION (2) a<br>CURRENT ESTIMATED POPULATION SERVED (2) b | LAB. CONTROL (3) | OWNERSHIP (4) |
| CITY (1) b | | | |
| | | | |

| | | | |
|---|---|---|---|
| NUMBER OF SERVICES<br>NUMBER OF METERS | | SOURCE OF SUPPLY | SAFE YIELD IMPOUNDED MG<br>MAXIMUM DEPENDABLE DRAFT (GRD. WATER) MG |
| 5 | | 7 | 8 |
| | | | |

| (5) CLASSIFICATION | NUMBER OF SERVICES | NUMBER OF METERS | MGD AVG. WATER | SOURCE OF SUPPLY (6) | SAFE YIELD IMPOUNDED MG (7) a<br>MAXIMUM DEPENDABLE DRAFT (GR. WATER) MG (7) b |
|---|---|---|---|---|---|
| RESIDENTIAL a | | | | | |
| COMMERCIAL b | | | | | |
| INDUSTRIAL c | | | | | |
| PUBLIC d | | | | | |
| TOTAL e | | | | | |

| | | | |
|---|---|---|---|
| RATED PLANT CAPACITY MGD<br>PLANT OUTPUT M | TREATMENT | DISTRIBUTION STORAGE<br>PUMPED TO MAINS | IMPROVEMENTS NEEDED |
| | | 11 | 12 |
| | | | |

| | | | |
|---|---|---|---|
| RATED CAPACITY MGD (8) a<br>AVERAGE DAILY (8) b<br>EMERGENCY (8) c | TREATMENT (9) | DIST. STORAGE<br>PUMPED TO MAINS MG (10) a<br>GRAVITY TO MAINS MG (10) b | IMPROVEMENTS NEEDED (11) |
| | | | |
| | | | |
| | | | |

REMARKS

BOB #85-S69004
Exp. March 1970

## MUNICIPAL WATER SUPPLY SANITARY SURVEY

SURVEY DATE

1. Leave this blank (for office use only) 1 12 (DUP. ON EVERY CARD) Date of your visit 13 mo. day yr. 18

2. Name of supply Same as on inventory

3. Location Same as on inventory
post office common name, if different

4. Demands, MGD:

| | PRESENT | 10-YR. ESTIMATE | UNKNOWN |
|---|---|---|---|
| A. Avg. day | From<br>19 ^ 23 | ☐☐☐☐☐<br>24 ^ 28 | ☐<br>30 |
| B. Max. day | Plant<br>31 ^ 35 | ☐☐☐☐☐<br>36 ^ 40 | ☐<br>42 |
| C. Max. month | Records<br>43 ^ 47 | ☐☐☐☐☐<br>48 ^ 52 | ☐<br>54 |

5. Water use has been restricted ☐☐ 55 56 times for a total of ☐☐☐ 57 59 days during any one year of the past 5 years.

6. LABORATORY CONTROL

A. Bacteriological (Distribution system only) From Fig 1- D.W.S

From plant records

| | | | UNKNOWN |
|---|---|---|---|
| (1) Min. number samples recommended per month by PHS DWS → | | ☐☐☐ 60 62 | |
| (2) Avg. number/month for last 12 months | | ☐☐☐ 63 65 | ☐ 67 |
| (3) Range of least and most monthly samples | from May be zero 68 70 to | ☐☐☐ 71 73 | ☐ 75 |

END CARD ONE 1 80

(4) Number of months the Drinking Water Standards were not met during the last 12 months for: No. of months

| | | UNKNOWN |
|---|---|---|
| (a) Quality — Sec 3.2 - D. W. S. | ☐☐ 13 14 | ☐ 15 |
| (b) Number of samples {Months when sample numbers < no. in 6.A.(1)} | ☐☐ 16 17 | ☐ 18 |
| (c) NONE collected No samples for ___ months. | ☐☐ 19 20 | ☐ 21 |

| | | |
|---|---|---|
| (5) Are samples representative of distribution system? Judge from map of distribution system. | ☐ yes 22 | ☐ no 23 |
| (6) Are check samples collected as provided for in the Drinking Water Standards? Sec 3.15 - D. W. S. | ☐ yes 24 | ☐ no 25 |
| (7) Are samples requiring check samples reported by telephone? | ☐ yes 26 | ☐ no 27 |
| (8) Is the laboratory certified? | ☐ yes 28 | ☐ no 29 |
| (a) Within the past 3 years? | ☐ yes 30 | ☐ no 31 |
| (b) If "yes" to one or both, by whom was it certified. | ☐ State 32 | ☐ PHS 33 |
| (9) Are samples received by lab within 30 hours? | ☐ yes 34 | ☐ no 35 |

Information from operator

ECA-19

-3- Name on each page

B(1)-(4) refer to Sec. 5.2-DWS.

B. Chemical (finished water only) 2

(1) Samples of finished water are analyzed each ☐ month, ☐ year,
36 37
☐ 2 years, ☐ 3 years, ☐ infrequently ☐ never.
38 39 40 41

(2) Type of analysis: ☐ everything ~~complete (DWS)~~ ☐ partial. If any constituent missed
42 43

(3) Date of last chemical analysis ☐☐ mo. ☐☐ day ☐☐ yr
45 50

(4) Analyzed by ☐ utility, ☐ state, ☐ PHS, ☐ university, ☐ other.
51 52 53 54 55

(5) Tests run for operational control and their frequency are:

| Tests | Frequency | | | | |
|---|---|---|---|---|---|
| | Continuous | Each shift | Daily | Weekly | Less frequently than weekly |
| Alkalinity | ☐ 37 | ☐ | ☐ | ☐ | ☐ 61 |
| Aluminum | ☐ 62 | ☐ | ☐ | ☐ | ☐ 66 |
| Chloride | ☐ 67 | ☐ | ☐ | ☐ | ☐ 71 |
| Chlorine residual | ☐ 72 | ☐ | ☐ | ☐ | ☐ 76 |
| (END CARD TWO) 2 80 | | | | | |
| Color | ☐ 13 | ☐ | ☐ | ☐ | ☐ 17 |
| Fluoride | ☐ 18 | ☐ | ☐ | ☐ | ☐ 22 |
| Hardness | ☐ 23 | ☐ | ☐ | ☐ | ☐ 27 |
| Iron | ☐ 28 | ☐ | ☐ | ☐ | ☐ 32 |
| Jar tests | ☐ 33 | ☐ | ☐ | ☐ | ☐ 37 |
| Manganese | ☐ 38 | ☐ | ☐ | ☐ | ☐ 42 |
| pH | ☐ 43 | ☐ | ☐ | ☐ | ☐ 47 |
| Taste & Odor | ☐ 48 | ☐ | ☐ | ☐ | ☐ 52 |
| Turbidity | ☐ 53 | ☐ | ☐ | ☐ | ☐ 57 |
| Zeta potential | ☐ 58 | ☐ | ☐ | ☐ | ☐ 62 |
| Other ______________ | ☐ 63 | ☐ | ☐ | ☐ | ☐ 67 |

Note other frequencies

C. Radioactivity

(1) Samples are analyzed each ☐ month, ☐ year, ☐ 2 years, ☐ 3 years,
69 70 71 72
☐ infrequently ☐ never. (END CARD 3) 3
73 74 80

(2) Date of last radiological analysis ☐☐ mo. ☐☐ day ☐☐ yr
13 18

(3) Analyzed by ☐ utility, ☐ state, ☐ PHS, ☐ university, ☐ other. (specify)
19 20 21 22 23

## 7. SANITARY SURVEY

A. Date of most recent survey ☐☐ mo. ☐☐ day ☐☐ yr. 29 or ☐ 30 no By others - Not this one

B. Survey made by: ☐ 31 state, ☐ 32 PHS, ☐ 33 local health department,
☐ 34 utility, ☐ 35 consultant. "Survey" requires written report of findings

C. Facilities surveyed: ☐ 36 source, ☐ 37 transmission, ☐ 38 treatment,
☐ 39 storage, ☐ 40 distribution.

## 8. FACILITIES & OPERATION (describe deficiencies on reverse side)

| | YES | NO |
|---|---|---|
| A. Are there common walls between finished and lesser quality water? | ☐ 41 | ☐ 42 |
| B. Are there inter-connections to other "systems" {Sub-divisions, private industrial, community | | |
| (1) of known acceptable quality indicated by state health dept acceptance. | ☐ 43 | ☐ 44 |
| (2) of unknown quality | | |
| (a) with protection Note how protected | ☐ 45 | ☐ 46 |
| (b) without protection | ☐ 47 | ☐ 48 |
| C. Is there a cross-connection control program | | |
| (1) on new construction only | ☐ 49 | ☐ 50 |
| (2) for continuous re-inspection | ☐ 51 | ☐ 52 |
| D. Are finished water reservoirs properly covered? | ☐ 53 | ☐ 54 |
| E. Is there detectable chlorine residual in distant parts of the distribution system? | ☐ 55 | ☐ 56 |
| F. Can the treatment plant be by-passed? | ☐ 57 | ☐ 58 |
| G. Are there satisfactory procedures to: | | |
| (1) prevent personal accidents | ☐ 59 | ☐ 60 |
| (2) prevent chlorine accidents | ☐ 61 | ☐ 62 |
| (3) disinfect all new and/or repaired distribution system mains, valves, fittings, including check samples before being placed in service? | ☐ 63 | ☐ 64 |
| H. Are there areas of low pressure ( < 20 psi) in the distribution system under maximum water use? | ☐ 65 | ☐ 66 |

I. Operating problems most often encountered are: ☐ 67 taste & odor
☐ 68 phenols, ☐ 69 corrosive water, ☐ 70 short filter runs, ☐ 71 other, specify.

8. FACILITIES & OPERATION, continued

J. Chlorination process was interrupted ☐☐ (72 73) times in the last 12 months.

(1) Interruptions were due to: ☐ (74) chlorinator failure, ☐ (75) feedwater pump, ☐ (76) changing cylinders, ☐ (77) power failure, ☐ (78) other, explain.

(END CARD 4) ☒ 4 (80)

K. Percent of land area within service area where water is available (nearest whole percent) ☐☐☐ (13 15) %.

| | YES | NO |
|---|---|---|
| L. Were plans and specs. for treatment plant approved by the state? | ☐ 16 | ☐ 17 |

9. SOURCE, TREATMENT & DISTRIBUTION **(describe deficiencies on reverse side)** Note

A. Are the following adequate:

| | YES | NO |
|---|---|---|
| (1) Source, with respect to the following: | | |
| (a) quantity | ☐ 18 | ☐ 19 |
| (b) bacteriological quality | ☐ 20 | ☐ 21 |
| (c) chemical quality | ☐ 22 | ☐ 23 |
| (d) physical quality | ☐ 24 | ☐ 25 |
| (e) adequate protection | ☐ 26 | ☐ 27 |
| (2) Transmission of raw water | ☐ 28 | ☐ 29 |
| (3) Is the raw water sampled for: | | |
| (a) Bacteriological contamination | ☐ 30 | ☐ 31 |
| (b) Chemical contamination | ☐ 32 | ☐ 33 |
| (4) Treatment, with respect to the folowing: | | |
| (a) aeration | ☐ 34 | ☐ 35 |
| (b) chemical feed, capacity | ☐ 36 | ☐ 37 |
| (c) chemical feed, stand-by equipment | ☐ 38 | ☐ 39 |
| (d) chemical mixing | ☐ 40 | ☐ 41 |
| (e) flocculation | ☐ 42 | ☐ 43 |

} Refer to PHS No. 1820

9. SOURCE, TREATMENT & DISTRIBUTION, continued

A. Are the following adequate (continued):

| | YES | NO |
|---|---|---|
| (4) Treatment, continued: | | |
| (f) settling | ☐ 44 | ☐ 45 |
| (g) recarbonation | ☐ 46 | ☐ 47 |
| (h) filtration At normal operating rates | ☐ 48 | ☐ 49 |
| (i) disinfection, capacity | ☐ 50 | ☐ 51 |
| (j) disinfection, stand-by equipment | ☐ 52 | ☐ 53 |
| (k) taste & odor control | ☐ 54 | ☐ 55 |
| (l) fluoridation | ☐ 56 | ☐ 57 |
| (5) Distribution, with respect to the following: | | |
| (a) storage | ☐ 58 | ☐ 59 |
| (b) booster chlorination | ☐ 60 | ☐ 61 |
| (c) high service pumping | ☐ 62 | ☐ 63 |
| (d) booster pumping | ☐ 64 | ☐ 65 |
| (e) pressure | ☐ 66 | ☐ 67 |
| (6) Maintenance | ☐ 68 | ☐ 69 |
| (7) Records for: | | |
| (a) disinfection | ☐ 70 | ☐ 71 |
| (b) filter runs | ☐ 72 | ☐ 73 |
| (c) chemical consumption | ☐ 74 | ☐ 75 |
| (d) operational control tests | ☐ 76 | ☐ 77 |
| (e) bacteriological examinations | ☐ 78 | ☐ 79 |
| (8) Cross-connection control | END CARD 5 | 5 80 |
| (a) ordinance | ☐ 13 | ☐ 14 |
| (b) program implementation | ☐ 15 | ☐ 16 |
| (c) progress | ☐ 17 | ☐ 18 |

9. SOURCE, TREATMENT & DISTRIBUTION, continued

B. During the past 3 years, raw water quality has ☐ 19 improved,
☐ 20 deteriorated, or ☐ 21 stayed the same.

10. PERSONNEL

A. Water Purification Operator

This is the responsible plant operator - Not sup't.

(1) Highest level of formal education: ☐ 22 8th grade or less,
☐ 23 high school, ☐ 24 technical or trade school, ☐ 25 university.

(2) Level of training in water treatment: ☐ 26 college course,
☐ 27 technical or trade school, ☐ short school, ☐ 29 on the job,
☐ 30 none, ☐ 31 other, specify ______________________.

(3) Length of time on this job: ☐☐ 32 33 years, ☐☐ 34 35 months.

(4) Number of previous positions as water treatment operator ☐☐ 36 37

(5) Total years of water purification experience ☐☐ 38 39

Get operator data for each supply even if there is no treatment.

(6) Level of study in sanitary microbiology: ☐ 40 college course,
☐ 41 technical or trade school, ☐ 42 short school, ☐ 43 on the job,
☐ 44 none, ☐ 45 other, specify ______________________.

(7) Level of study in water chemistry: ☐ 46 college course, ☐ 47 technical
or trade school, ☐ 48 short school, ☐ 49 on the job, ☐ 50 none,
☐ 51 other, specify. ______________________.

(8) Is the operator a full-time employee? ☐ 52 yes ☐ 53 no

(9) Salary range (per year) of operator: ☐ 54 <$1,999 ☐ 55 $2,000-4,999
☐ 56 $5,000-7,499 ☐ 57 $7,500-9,999 ☐ 58 $10,000

10. PERSONNEL, continued

A. continued

(10) Is your present staff adequate in: Operator's opinion

(a) number ☐ 60 yes ☐ 61 no

(b) quality ☐ 62 yes ☐ 63 no

B. Operator's major complaint

C. Most frequent customer's complaint: Received by utility.

D. Management's most frequent complaint:

11. FINANCIAL INFORMATION

A. Bonded indebtedness: (water supply)

(1) General obligation bonds $ ☐☐☐☐☐☐☐☐. 66 13 END CARD 6 ☐ 6 80

(a) statutory limit $ ☐☐☐☐☐☐☐☐. 13 20

(2) Revenue bonds $ ☐☐☐☐☐☐☐☐. 21 28

(a) statutory limit $ ☐☐☐☐☐☐☐☐. 29 36

B. Capital stock, par value $ ☐☐☐☐☐☐☐☐. 37 44

bonds, par value $ ☐☐☐☐☐☐☐☐. 45 52

C. Water funds are ☐ 53 kept separate or ☐ 54 mingled with other funds.

D. Is there an annual payment to the general fund? ☐ 55 yes ☐ 56 no

E. Operation is controlled by: ☐ 57 mayor-council, ☐ 58 mayor-commission,

☐ 59 independent water board, ☐ 60 other, specify. ________________.

For city, district, etc owned only

F. Is there active planning for expansion or improvement? ☐ 61 yes ☐ 62 no

(1) Value of planned improvement $ ☐☐☐☐☐☐☐☐. 63 70

(2) Planning by utility ☐ 71 yes ☐ 72 no utility only

(3) Planning by consultants ☐ 73 yes ☐ 74 no utility & consultants END CARD 7 ☐ 7 80

G. If expansion is planned, it will be carried out within:

| | 1 YR. | 2-5 YRS. | 6-10 YRS. |
|---|---|---|---|
| (1) Source | ☐ 13 | ☐ | ☐ 15 |
| (2) Treatment | ☐ 16 | ☐ | ☐ 18 |
| (3) Distribution | ☐ 19 | ☐ | ☐ 21 |
| (4) Other ________________ | ☐ 22 | ☐ | ☐ 24 |

H. Costs of production:

| | CENTS/1,000 GALLONS |
|---|---|
| (1) Chemicals | ☐☐.☐ 26 28 |
| (2) Labor, power, etc. | ☐☐.☐ 29 31 |
| (3) Depreciation | ☐☐.☐ 32 34 |
| (4) Other, including office, administration, meter reading, collection, etc. | ☐☐.☐ 35 37 |
| (5) Total | ☐☐.☐ 38 40 |

11. FINANCIAL INFORMATION, continued

I. Tariff (Residential)

(1) Connection fee $ ☐☐☐☐. 41 44

(2) Sales unit is ☐ 45 per 1,000 gallons or ☐ 46 per 100 cu. ft.

(a) ☐☐☐ 47 cents for the first ☐☐ 50 51 units

(b) ☐☐☐ 52 cents for the next ☐☐ 55 56 units

(c) ☐☐☐ 57 cents for the next ☐☐ 60 61 units

Adjust all rates to these units.

(d) etc. as needed to cover steps.

END CARD 8 [8] 80

Note flat rate here as $/time unit

ECA-[illegible]

UNITED STATES PUBLIC HEALTH SERVICE
ENVIRONMENTAL CONTROL ADMINISTRATION
BUREAU OF WATER HYGIENE
IDENTIFICATION OF WATER SAMPLE

-11-

SERIAL NO.
9[illegible]

PUNCH IN COL.

LOCATION OF WATER SUPPLY Same as on inventory
CITY, COUNTY, STATE

WATER SUPPLY CODE NO. ☐☐☐☐☐☐☐☐☐☐☐☐

WATER SUPPLY NAME Same as on inventory

DATE OF SAMPLING  BEGINNING DATE OF COMPOSITE  MO. ☐☐ YR. ☐☐  ENDING DATE OF COMPOSITE OR DATE OF GRAB SAMPLE  MO. ☐☐ DAY ☐☐ YR. ☐☐

SAMPLED FROM ☐ TREATMENT PLANT ☐ WELL ☐ RESERVOIR ☐ DISTRIBUTION SYSTEM ☐ [illegible] ☐

SAMPLING POINT LOCATION AND/OR DESCRIPTION i.e. kitchen, 1234 Main

TYPE OF WATER SAMPLE ☐ FINISHED ☐ PARTIALLY TREATED ☐ RAW ☐ ☐

SOURCE OF WATER ☐ SURFACE ☐ GROUND ☐ COMBINED ☐ ☐

SAMPLING METHOD ☐ COMPOSITE ☐ GRAB ☐ ☐

9. ANALYSIS REQUIRED ☐ ORGANIC ☐ TRACE ELEMENTS ☐ WET ☐ RADIOCHEMICAL ☐ OTHER ☐

10. WATER SUPPLY CATEGORY ☐ COMMUNITY WATER SUPPLY ☐ [illegible] ☐ FEDERAL INSTALLATION ☐ SPECIAL STUDY ☐ OTHER ☐

11. APPEARANCE OF SAMPLE ____________________

12. ADDITIONAL REMARKS ____________________

COLLECTED BY ____________________ ☐ [illegible] ☐ OTHER ☐

DO NOT WRITE BELOW THIS LINE

LAB. SAMPLE NO. ____________________ DATE RECEIVED ____________________
LABORATORY REMARKS

SEE [illegible] INSTRUCTIONS

INSTRUCTIONS: EVERY ITEM OF INFORMATION REQUIRED FROM THE SAMPLER IS NUMBERED (1 THROUGH 13). THESE ARE THE ONLY RESPONSES THE SAMPLER SHOULD MAKE. NOTE AREAS MARKED ''DO NOT WRITE BELOW THIS LINE'' AND ''FOR OFFICE USE ONLY.''

ITEM 1 SHOULD BE THE LOCATION OF THE WATER SUPPLY FACILITY WHICH PRODUCED THE WATER FOR THE SAMPLE. (EXAMPLE: CINCINNATI, HAMILTON, OHIO.)

ITEM 2 SHOULD BE THE FULL NAME OF THE WATER SUPPLY FACILITY. (EXAMPLE: CINCINNATI MUNICIPAL WATER WORKS)

ITEMS 4, 6, 7, AND 8 - CHECK THE BOX WHICH APPLIES

ITEMS 9 AND 10 - CHECK ONE OR MORE BOXES AS NECESSARY

ITEMS 3, 5, 11, 12, AND 13 SHOULD BE SELF-EXPLANATORY

ANY RESPONSE OF ''OTHER'' OR ''SPECIAL STUDY'' SHOULD BE EXPLAINED UNDER ITEM 12 - ADDITIONAL REMARKS.

IF NECESSARY FOR COMPLETE IDENTIFICATION OR EXPLANATION, PLEASE FEEL FREE TO USE THE BACK OF THE ORIGINAL (WHITE) COPY OR ATTACH AN ADDITIONAL PAGE OF LIKE SIZE.

DISTRIBUTION:

MAIL ORIGINAL (WHITE COPY) TO:

WATER QUALITY REGISTER BRANCH
BUREAU OF WATER HYGIENE
222 E. CENTRAL PARKWAY
CINCINNATI, OHIO 45202

| | |
|---|---|
| BLUE | ENCLOSED WITH ORGANIC SAMPLE |
| PINK | ENCLOSED WITH TRACE METAL SAMPLE |
| YELLOW | ENCLOSED WITH WET CHEMISTRY SAMPLE |
| GREEN | ENCLOSED WITH RADIOCHEMICAL SAMPLE |
| TAN | RETAINED BY REGIONAL OFFICE OR SAMPLER |

## APPENDIX G. DEFINITIONS

**BACK FLOW**
The flow of water or other liquids, mixtures, or substances into the distributing pipes of a potable supply of water from any source or sources other than its intended source. Back siphonage is one type of backflow.

**BACK FLOW CONNECTION**
Any arrangement whereby backflow can occur.

**BACK SIPHONAGE**
The flowing back of used, contaminated, or polluted water from a plumbing fixture or vessel or other sources into a water supply pipe due to a negative pressure in such pipe.

**BAD SAMPLE**
A bacteriological sample that showed the presence of coliform bacterial contamination.

**CONSUMER**
One person using the water for domestic and culinary purposes.

**CROSS-CONNECTION**
Any physical connection or arrangement between two otherwise separate piping systems. One of which contains potable water and the other either water of unknown or questionable safety, or steam, gas, or chemical, whereby there may be a flow depending on the pressure differential between the two systems. See Backflow and Back siphonage.

**FECAL COLIFORM BACTERIA**
That portion of the total coliform population which are capable of lactose fermentation at an elevated temperature of 44.5°C. Unlike some strains of the non-fecal members of the total coliform group, fecal coliforms have a specific high order of positive correlation with warm-blooded animal pollution, survive for a shorter time in water and soil, and more closely correlate with survival patterns of enteric pathogenic bacteria.

**GOOD SAMPLE**
A bacteriological sample that did not show the presence of coliform bacterial contamination.

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INTER-CONNECTION

A connection between the water supply and one or more additional sources of water not under the jurisdiction or control of the water supply operator.

MANDATORY LIMIT

The upper limit of density of coliform bacteria as described in Section 3.23, as modified below, of the concentration of certain ions as described in Section 5.22 and 5.23 and of radioactivity as described in Section 6.22, Public Health Service Drinking Water Standards, 1962 (PHS Publication No. 956). For these samples collected for this study, the bacterial limit was exceeded if the arithmetic average was more than 1 coliform per 100 ml. Also, for this study the total chromium concentration was considered to be hexavalent chromium.

PERSONS SERVED

The aggregate number of consumers.

PLATE COUNT

A measure of the general bacterial population present in the water sample as described in Standard Methods for the Examination of Water and Wastewater, 12th Ed. These bacteria will produce colonies on plate count agar in 48 hours when incubated at 35°C (95°F).

RECOMMENDED LIMIT

The upper limit of concentration of turbidity, color, chemicals and radioactivity as described in Sections 4.2; 5.21; and 6.21, PHS Drinking Water Standards, 1962 (PHS Publication No. 956).

RESPONSIBLE OPERATOR

The operator at the treatment plant responsible for the day to day operation of the treatment facilities.

Where there is no treatment, the person responsible for the operation of the system.

He is not necessarily the water superintendent.

SERVICE CONNECTION

A physical connection to a water main for the purpose of conveying water to a building or onto a premise for use.

## STANDARD METROPOLITAN STATISTICAL AREA

The boundaries and titles of standard metropolitan statistical areas are established by the Bureau of the Budget with the advice of the Federal Committee on Standard Metropolitan Statistical Areas. This Committee is composed of representatives of the major statistical agencies of the Federal Government. In applying the following criteria, data from the following sources are used by the Committee:

Population, labor force, density, and occupational data: Bureau of the Census and Bureau of Employment Security.

Employment by place of work: Bureau of Old-Age and Survivors Insurance, Department of Labor, Department of Defense, and Civil Service Committee.

Volume of commuting: Bureau of the Census and Bureau of Employment Security.

An SMSA is a county or group of contiguous counties which contains at least one city of 50,000 inhabitants or more or "twin cities" with a combined population of at least 50,000. In addition to the county, or counties, containing such a city or cities, contiguous counties are included in an SMSA if, according to certain criteria, they are essentially metropolitan in character and are socially and economically integrated with the central city. The criteria followed in the delineation of SMSA's relate to a city, or cities, of sufficient population size to constitute the central city and to the economic and social relationships with contiguous counties that are metropolitan in character.

1. Each SMSA must include at least: a. One city with 50,000 inhabitants or more, or b. Two cities having contiguous boundaries and constituting, for general economic and social purposes, a single community with a combined population of at least 50,000, the smaller of which must have a population of at least 15,000.

2. If two or more adjacent counties each have a city of 50,000 inhabitants or more and the cities are within 20 miles of each other (city limits to city limits), they will be included in the same area unless there is definite evidence that the two cities are not economically and socially integrated.

The criteria of metropolitan character relate primarily to the attributes of the outlying county as a place of work or as a home for a concentration of nonagricultural workers. Specifically, these criteria are:

3. At least 75 percent of the labor force of the county must be in the nonagricultural labor force.

4. In addition to criterion 3, the county must meet at least one of the following conditions: a. It must have 50 percent or more of its population living in contiguous minor civil divisions with a density of at least 150 persons persquare mile, in an unbroken chain of minor civil divisions with such density radiating from a central city in the area. b. The number of nonagricultural workers employed in the county must equal at least 10 percent of the number of nonagricultural workers employed in the county containing the largest city in the area, or the outlying county must be the place of employment of at least 10,000 nonagricultural workers. c. The nonagricultural labor force living in the county must equal at least 10 percent of the nonagricultural labor force living in the county containing the largest city in the area, or the outlying county must be the place of residence of a nonagricultural labor force of at least 10,000.

TOTAL VERIFIED COLIFORMS

Microorganisms that include a heterogeneous grouping of bacteria which are identified by bacteriological procedures to produce a aldehydes on Endo media at 35°C and were shown to ferment lactose with gas production within 48 hours at 35°C in either aerobic or facultative anaerobic environments. Because these bacteria are eliminated in large numbers in fecal wastes, they have been the traditional bacteriological tool used to measure the occurrence and intensity of contamination in water supplies.

WATER SUPPLY

Water supply system includes the works and auxiliaries for collection, treatment, storage and distribution of water from the sources of supply to the free-flowing outlet of the ultimate consumer. Water supplies were included in this study, if they had 15 or more service connections and/or served 25 or more consumers.

Special Water Supplies - are those supplies serving trailer and mobile home parks and institutions with resident populations.

Community Water Supplies - are all other supplies studied in an SMSA.